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PASSAIC VALLEY SEWER UNDER CONSTRUCTION IN NEWARK—LOOKING NORTH FROM ERIE RAILROAD.

CONSTRUCTION WORK ON THE PASSAIC VALLEY SEWER

Trench Machines, Cableways, Traveling Derricks and Other Excavating Apparatus.—Sheeting and Bracing Methods.
—Handling Water.—Mixing Concrete.—Tunneling by Compressed Air.—Pumps and Boiler Plants.

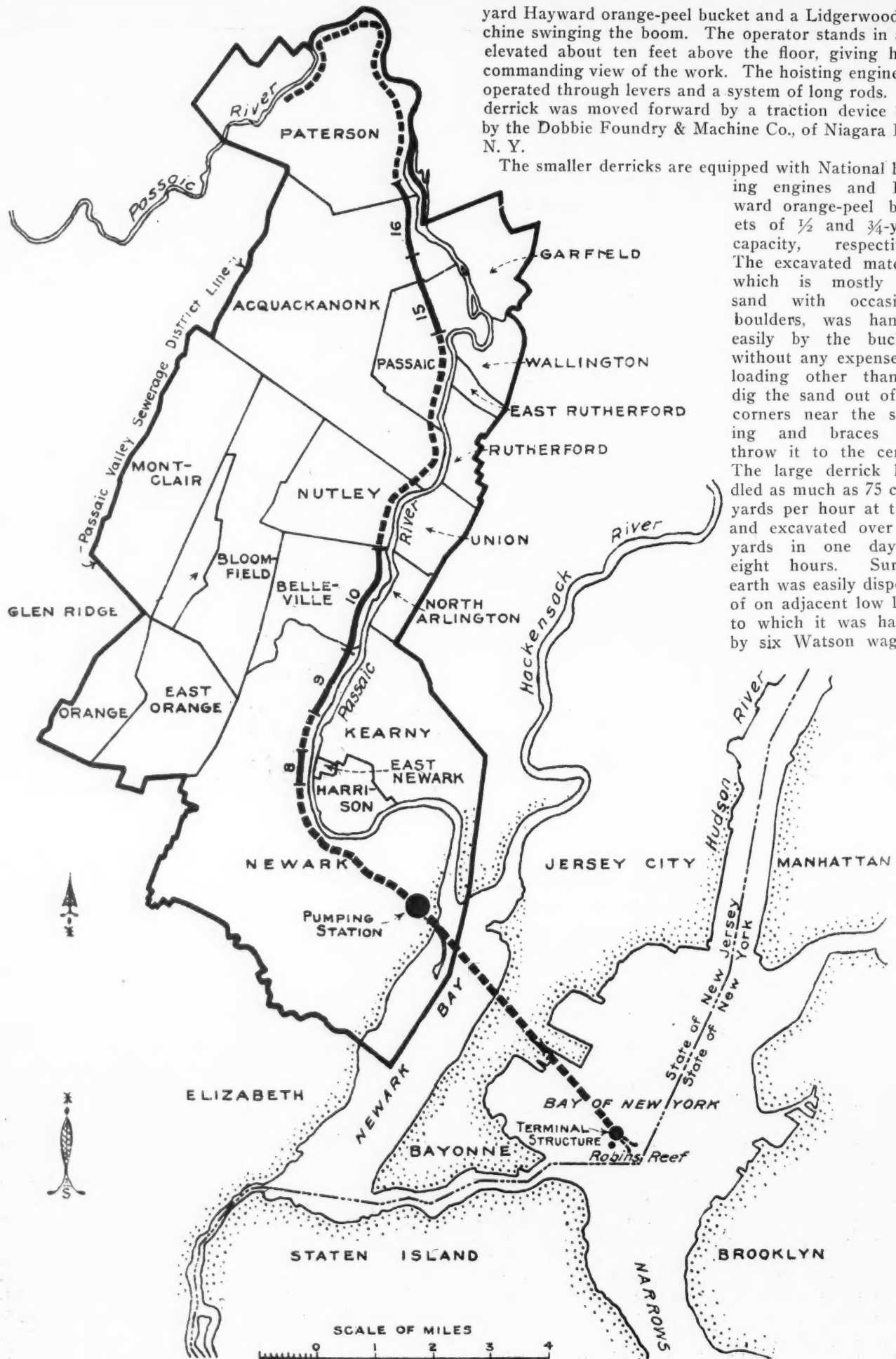
Six years ago Municipal Journal began as follows an article dealing with the Passaic river pollution: "The signing by Governor Stokes, of New Jersey, on March 18th, of the Passaic Valley Sewer Bill will probably begin the ending of the history of the preliminaries to the actual purification of the Passaic river." This article reviewed at some length the history of the preliminaries, beginning in 1895. The preliminary work was not finally concluded until last year, when actual construction began on the intercepting sewer which will receive the sewage from about 700,000 people in Newark, Glen Ridge, Bloomfield, Belleville, Nutley, Passaic, Paterson, Acquackanonk, Garfield, Wallington, Rutherford, East Rutherford, Union, North Arlington, Kearney, Harrison and East Newark. This sewage will be conducted to the meadows southeast of Newark, where it will be treated and the effluent carried to the channel in New York harbor. The general location of these cities and towns and of the sewer is shown on the map on the following page. The following article deals with the construction methods employed on the several sections on which work has been

begun. Of the remaining sections some have been let, while on others no bids have yet been received:

SECTION NO. 9.

Construction began on Section 9, located in the northern part of Newark, on July 26, 1912. The work, for which the McCauley Manton Co., of Newark, are the contractors, consists of 1,700 feet of 10-ft. 6-in. open cut work and 900 feet of tunnel. At the present time the open cut work has been practically completed and a shaft has been sunk for the tunnel. The depth of cut has averaged about 25 feet.

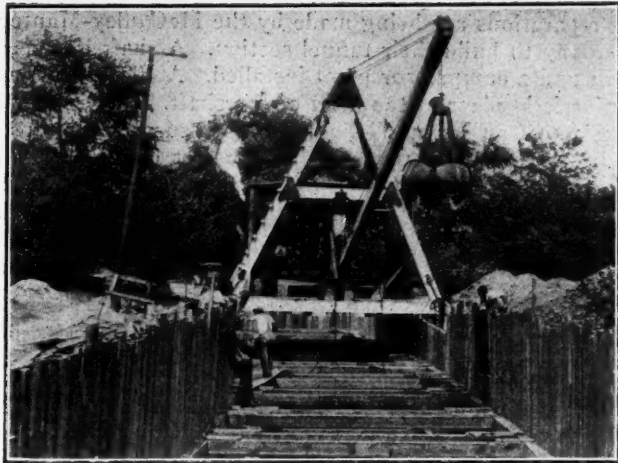
Travelling derricks have been used throughout for the excavation, three having been used part of the time, but generally two. The derricks were built on the ground, the frame work being wide enough to span the 17-foot wide ditch and travel on tracks just outside of the line of excavation. The largest derrick, which generally excavated the upper 14 feet or so of the cut and was followed by a lighter machine finishing up the bottom, is equipped with a Flory hoisting engine $8\frac{3}{4}$ by 12-inch cylinders, 40 horsepower boiler, controlling the one-cubic



MAP OF PASSAIC VALLEY SEWERAGE DISTRICT AND VICINITY.

yard Hayward orange-peel bucket and a Lidgerwood machine swinging the boom. The operator stands in a cab elevated about ten feet above the floor, giving him a commanding view of the work. The hoisting engines are operated through levers and a system of long rods. This derrick was moved forward by a traction device made by the Dobbie Foundry & Machine Co., of Niagara Falls, N. Y.

The smaller derricks are equipped with National hoisting engines and Hayward orange-peel buckets of $\frac{1}{2}$ and $\frac{3}{4}$ -yards capacity, respectively. The excavated material, which is mostly fine sand with occasional boulders, was handled easily by the buckets, without any expense for loading other than to dig the sand out of the corners near the shoring and braces and throw it to the centre. The large derrick handled as much as 75 cubic yards per hour at times and excavated over 500 yards in one day of eight hours. Surplus earth was easily disposed of on adjacent low land, to which it was hauled by six Watson wagons.



ORANGE PEEL DREDGE EXCAVATING SEWER.

wagons. The back filling was done by one of the smaller derricks.

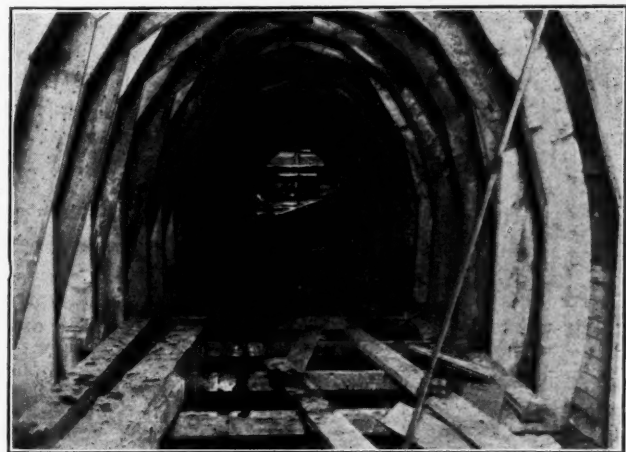
For shoring the excavation, pieces of 8x8 pine 12 feet long were used as stringers. For braces logs were used, two braces being used for each stringer. The braces were placed about a foot and a half from the end of the stringer, the object being to leave as much clear space as possible for the free operation of the excavator. Logs were used in preference to square sticks because the latter became frayed after they were used a few times, whereas round timber could be used a dozen times without serious injury. Sheeting was placed in two and occasionally three tiers. For the top tier 2-in. by 10-in. and 16 feet long hard wood or pine was used. For the lower tier 2-in. by 6-in. 16 feet long tongue and groove pine had to be used on account of the shifting nature of the soil and the excessive amount of water. All sheeting was left in place.

In some parts of the work, as under a railroad bridge, Wemlinger steel sheet piling was used. Some of this was left in place because it was found impossible to pull it up.

Three tiers of sheeting were used in part of the trench where the excavation was deeper than usual and where the sheeting had to be driven below the bottom line of

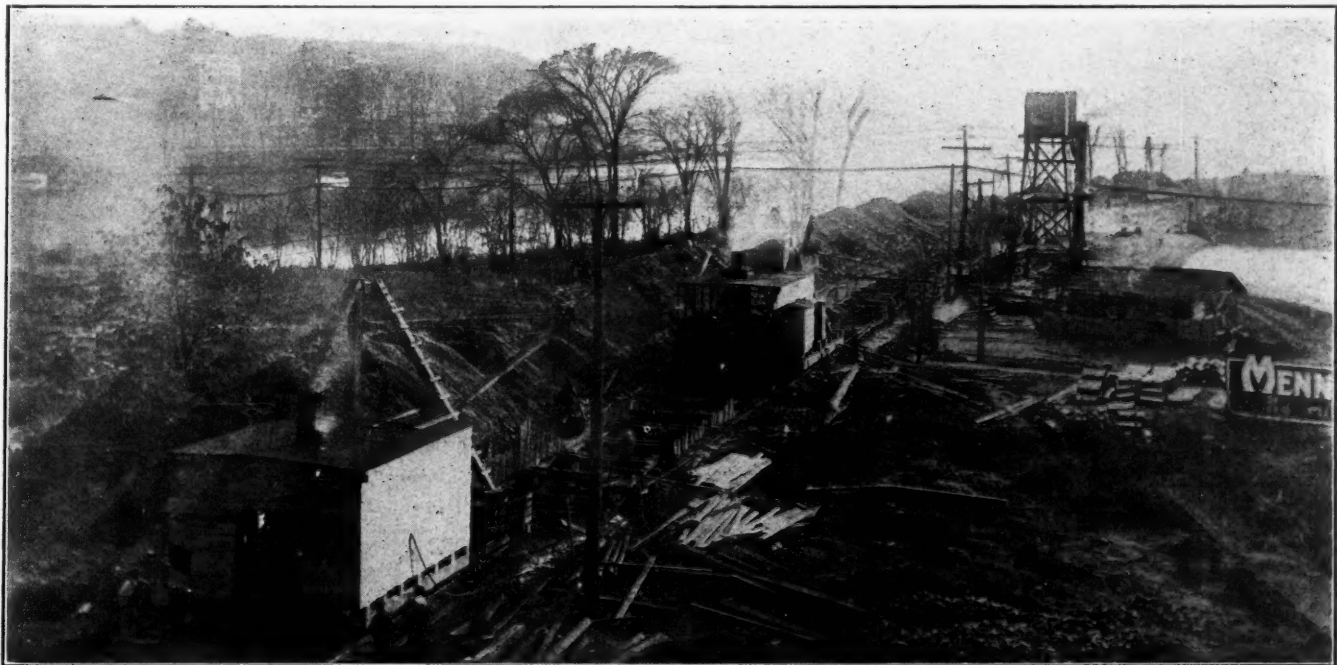
the sewer to keep the soft soil from pushing up in the bottom. Even for the underdrain sheeting had to be used, in pieces 4 feet long. All sheeting was driven with an ordinary hand maul.

Large amounts of water have had to be handled at all times. To the successful handling of this water and the powerful excavating machinery employed is attributed the speed of the work for which the contractors have been generally commended. Two centrifugal pumps were installed at the main sump, connecting with the underdrain, a boiler from one of the dismantled excavators supplying the steam most of the time. One of these pumps was a Rogers, 8-inch suction, 6-inch discharge; the other was a Morris, 6-inch suction 4-inch discharge. Only a fraction of the water, however, was handled by these pumps. Three Pulsometer pumps, two of which were 5-inch and one 3-inch, were operated in the box of the under-drain as soon as it was built. It was the policy to keep moving the pumps forward, keeping them as

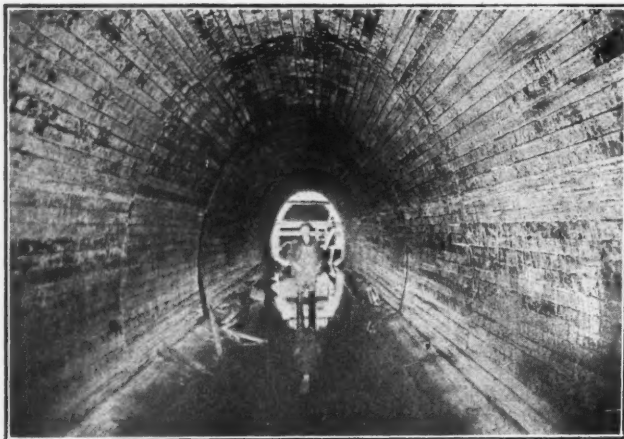


CENTERING IN SEWER, SECTION 9.

near the rough excavation as possible. As a 5-inch Pulsometer is estimated to throw 900 gallons of water per minute with a 25-foot lift, an idea of the volume of water handled may be obtained. The contractor states that at times the Pulsometer operated steadily for a week or ten



WORK ON SECTION 9, LOOKING SOUTH FROM ERIE RAILROAD.



INTERIOR VIEW OF COMPLETED SEWER, SECTION 9.

days at a time without receiving the slightest attention from anybody for any purpose.

Forms for constructing the concrete sewer were made of wood. The ribs were made of 2-inch pine in two sections, fastened together when in use by an iron plate at the top, bolted. These ribs were set up 2 ft. 6 ins. apart. At the base the ribs were held by a brace notched at the ends to support the ribs. For lagging 2x4-inch pine, 16 feet long, cut on a bevel on the sides, were used. These wooden forms have an advantage in that they permit the braces holding the sheeting to remain in place longer than is possible in case of steel forms. One carpenter and two helpers did all the work of taking down and setting up the forms. The same ribs were used over again throughout the work, none being injured by the nails driven through the lagging. Forms were left in place from three days to a week.

Concrete, which was composed of gravel, sand and Whitehall Portland cement, proportioned 1:2:4, was mixed in a Smith $\frac{1}{2}$ -yard mixer. The mixed material was delivered by chute to a platform and from that shovelled into place. The concrete was placed in three parts—invert, sides and arch. Sections of 32 linear feet were worked at one time. About 60 cubic yards of concrete in place was a day's work.

Preparations are being made by the McCauley-Manton company to build their tunnel section. A shaft has been sunk and a compressor plant installed. A Flory hoisting engine is in place at the head of the shaft. The air plant consists of an Ingersoll-Rand low pressure, 12x18 $\frac{1}{4}$ x12-inch compressor, capacity 830 cubic feet of free air per minute; a McKiernan 20x20x24-inch compressor, capacity 870 feet, and two Ingersoll-Sargent compressors; bringing the total capacity of the plant up to 2,400 cubic feet of free air per minute. There are three boilers, total capacity 260 horsepower; two air tanks and accessories.

SECTION NO. 10.

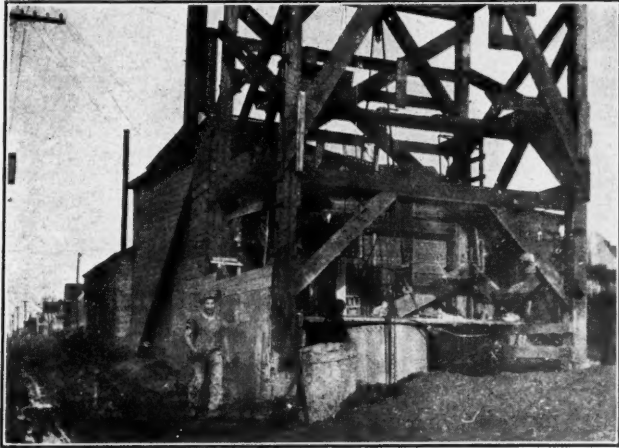
On section No. 10, in Belleville, Bruno & Pettiti, contractors, Boston, Mass., are building a section of 10 ft. 6 in. sewer in open cut. They have been on the ground several months and have finished a short section. This company has a Carson-Lidgerwood trench machine at work. The cut is of about the same depth as in section No. 9 and the soil conditions about the same, but there is less water. The bracing of the sheeting is designed to suit the peculiarities of the machine used. Six buckets are used at one time, being filled, raised and conveyed to the dumping point as a unit. These buckets are attached to the cable at intervals of eight feet. The stringers are 16 feet long and are braced at the ends and centers. The upper course of sheeting is composed of 2 by 6 tongue and groove. Each bucket is filled by one shoveller. The buckets are raised and carried down the line to a crossing, where teams drive under and receive their load directly. The frame of the excavator is about 275 feet long. The engine and housing rest on solid ground in advance of the work. The ditch is wider than the tracks on which the machine runs, which is therefore supported by timbers laid across the excavation.

All water is being handled from a sump into which the water from the underdrain is delivered. There a Lawrence Machine Company's 6-inch centrifugal pump has been installed, driven by an Atlas engine. There is also a 6-inch centrifugal pumping unit, pump and vertical engine on one frame, made by the Marine Engine & Boiler Works, of Erie, Pa.

A half-yard Ransome mixer has been placed at a con-



CARSON-LIDGERWOOD TRENCH MACHINE ON SECTION NO. 10.



HEAD HOUSE TO SHAFT, SECTION NO. 15.

venient street intersection. The mixer is loaded by wheelbarrows and the concrete wheeled in barrows and concrete carts to the side of the ditch, where it is dropped through pipes to a platform, and from there shoveled to place. The invert is laid with the aid of a template. Wooden forms are put in place for the sides. These forms are made in 16-foot units of ribs and lagging and are moved forward without being taken apart. Steel forms are used for the arch.

The work apparently is proceeding in a very regular and methodical manner and economically. However, the speed is not as great as that made where the powerful traveling excavating derricks are used. But by using three sets of buckets, one in the trench loading, one loaded and being discharged and a third set on the return cable, much greater speed can be made and presumably will be as the weather improves and the gang gets broken in to the work.

SECTION NO. 15.

In Passaic, Donlon & Co., of Brooklyn, N. Y., have a long section of sewer 6 feet 9 inches in diameter. Most of this is in tunnel and part of it has been sublet to the Haskins Co., of Boston, Mass. Several hundred feet of open cut work at the south end of the section has been finished, and work is now going on in an open cut about 30 feet deep. A Lidgerwood cableway is used for the excavation. The towers are set up about 250 feet apart and Steubner turn-over buckets handle the excavated material. This is of much the same character as in the other sections already described. Veins of coarse sand are found in sufficient quantity to make the concrete, but most of the material is fine sand which flows when bearing water. The water seems to be less in quantity, although it presents the same difficulties as is experienced further south in the line of the work. Two Pulsometer pumps, one 5-inch and one 3-inch, handle it.

LIDGERWOOD CABLEWAY, CONTRACT NO. 15.
CUBE CONCRETE MIXER IN INTERSECTING STREET.

Sheeting is laid in three tiers. The cross braces do not have to be placed at such regular intervals as where the other type of excavators are used. All that is necessary is free access for the bucket to the bottom of the ditch. Dirt, of course, has to be shoveled into the bucket. Concrete is mixed in a Municipal Engineering Company's half-yard cube mixer located in an intersecting street. This mixer is equipped with a loading skip. Concrete is delivered into buckets carried on cars running on a short section of track extending over the trench. From here the buckets are lifted by the cableway and carried to place. Crushed trap rock is being used for concrete, most of it being brought to the work in Garford motor trucks belonging to the Union Building & Construction Company, which operates quarries.

A few hundred feet north of this excavation another has been started. Here a traveling derrick built on the work is handling the dirt. A few hundred feet further north a shaft is being sunk for the beginning of a tunnel section. As the street here is wide, the concrete plant is placed in the street on one side of the shaft, and the air plant is on the other side. The mixer is a Smith, with loading skip.

The tunnel sections sublet to the Haskins company are half a mile or more further north. Two shafts have been sunk and some work has been finished at each. One shaft, at Ackerman avenue, is 48 feet deep. The sewer is 6 feet 9 inches in diameter. At this point about 100 feet have been finished. Under an air pressure of about ten pounds the excavation is dry and no pumping is necessary. When the pressure is off, a Worthington pis-



HEAD HOUSE OF SHAFT, SECTION NO. 8.

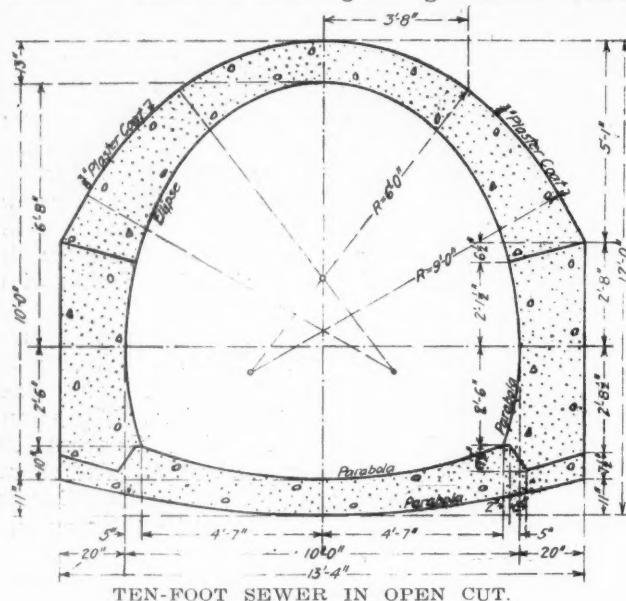
ton pump takes care of the water. There are three air compressors at this shaft, two Ingersoll and one Rand, having a total capacity of about 3,000 cubic feet of free air per minute.

The second shaft is at Scribner place. The sewer is of the same size and the depth about the same. Here 400 feet have been finished. The air plant consists of three Ingersoll and one Knowles compressors. The excavated material is of the same character at both points—coarse and fine sand and boulders. The bottom of the sewer is in rock—red sandstone. Both wooden and steel forms are used. The steel forms are made by the contractor. They are in three-foot sections and are taken apart and moved ahead without the use of a carriage. Up to the present time the concrete materials have been taken into the tunnel dry and mixed by hand close to the work. At the Ackerman avenue shaft the concrete will be mixed at the top of the shaft, lowered in buckets and carried to the work on a Koppel railroad. The trucks of the cars are of Koppel manufacture, but the bodies are made by the contractor. The roof of the tunnel excavation is being supported by segmental steel plates which are left in place. Work seems to be proceeding on the Haskins sections in a regular and methodical man-

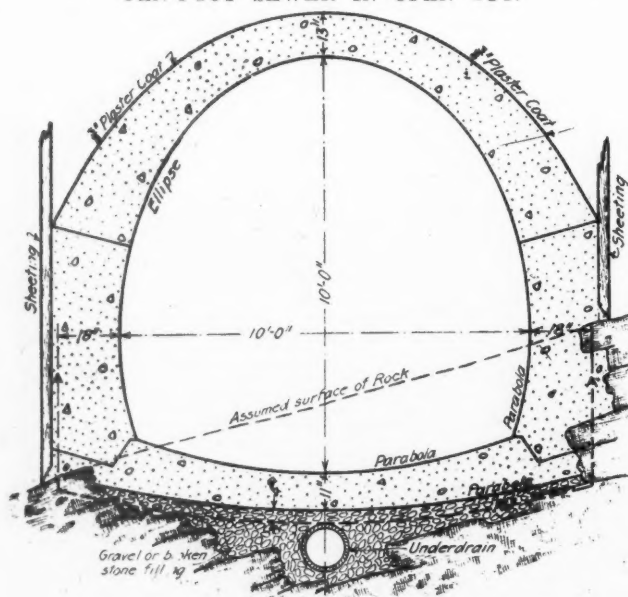
ner and good progress is being made considering the difficulties.

SECTION NO. 8.

On the south half of No. 8, 1,800 feet of 11-foot tunnel to be built under compressed air, work has been fairly started by the contractor, the Healey Contracting Co., of New York City. A shaft 47 feet deep has been sunk at Fourth avenue, Newark. At places this tunnel will be 53 feet below the surface. In sinking the shaft, cement was injected into the surrounding sandy soil by means of a Cockburn cement grouting machine. The air



TEN-FOOT SEWER IN OPEN CUT.



TEN-FOOT SEWER IN PARTIAL ROCK CUT.

plant consists of two Ingersoll-Sargent compressors each of 1,400 cubic feet free air capacity per minute. These, with the boilers, are located on a lot outside of the street line; hence the street, as shown in the illustration, is not closed. The boiler plant consists of three boilers having a total capacity in rated horse power of 355. (In connection with the question of boilers it is worth noting that the newest boiler is of the marine type. The same was noted in two boiler plants of other sewer contractors. The marine type occupies less floor space than the locomotive type, that used to be the favorite with contractors, and besides they are good steamers.) The pumping plant consists of two Worthington and one Knowles piston pumps and a Lawrence 4-inch centrifugal. Concrete will be mixed by a Ransome one-cubic yard mixer:

A 30 horse power hoisting engine is installed at the shaft operating the derrick. Segmental steel plates 5-16 inch thick will be used to protect the roof of the excavation. The contractor is making arrangements to handle the excavated material by means of a compressed air device of his invention. This, of course, will require an independent air supply carrying a pressure of 50 pounds or more. The pressure in the tunnel will probably not be much more than 10 pounds.

SECTION NO. 16.

At section No. 16, in Paterson, the contractor, James H. Holmes, of New York City, is getting his machinery on the ground and already has excavated a sump pit and installed two electrically driven Emerson centrifugal pumps. All of the machinery on the ground seems to be new, and so far as general appearances go is the finest to be found on the line of the work. Two traveling excavators are on the ground, one of these a very interesting one. The machine was made by Bartlett & Snow, of Cleveland, and consists of platform and derrick with a structural steel boom, the machine incorporating some of the principles of the locomotive crane. The hoisting engine, which is electrically operated, is made by the S. Flory Mfg. Co., of Bangor, Pa.

Contracts for other sections of the sewer have been let as follows: Sections 7 and 14, to Booth & Flynn of Pittsburgh, Pa.; Section 12 to Frawley Kaufman Contracting Co. of New York. The north half of Section 8 to E. E. Smith Contracting Co. Details of work on these sections will be described later on, when the work has progressed further.

SEWAGE PURIFICATION IN NEW YORK.

Of the five boroughs of Greater New York City, Manhattan and Richmond Boroughs each occupy an entire island, while Richmond and Queens are situated on the west end of Long Island. As these islands are all surrounded by salt water, it relieves the city of many of the difficulties of disposing of its sewage which are experienced by many other large cities. The eastern part of the Borough of Brooklyn, however, slopes towards the southeast, where the shore is not washed by the ocean, but consists of a number of shallow bays and inlets into which drain a few small streams. In this section of the city it has therefore been necessary almost from the beginning to treat the sewage in some way before finally discharging it into these sluggish waters. There are at the present time three disposal plants in operation in this section of the city. At Elmhurst the sewage is pumped from a receiving well to plain sedimentation tanks, the effluent from which is filtered through sand filters and finally discharged into a creek flowing into Flushing Bay. This plant treats about 500,000 gallons per day.

At Jamaica the sewage flows by gravity through precipitation tanks, having first been treated with lime and copperas, and the effluent is discharged without further treatment into the creek which, after flowing about a mile across a meadow, empties into Jamaica Bay. From 2,000,000 to 4,000,000 gallons per day are treated at this plant.

At Far Rockaway the sewage is pumped from a receiving well to precipitation tanks, being first treated with lime and copperas, after which it flows into Jamaica Bay. This plant treats from 700,000 to 2,000,000 gallons per day.

The sludge which is collected at the Elmhurst plant is dried on a bed of pea coal and burned in boilers. At Far Rockaway and Jamaica the sludge is discharged by centrifugal pumps into lagoons which surround the plant and is there allowed to dry naturally. Some of the dry sludge is carried away by farmers living in the vicinity.

SEWAGE TREATMENT AT ATLANTA, GA.

Grit Chambers, Imhoff Tanks, Screens, Roughing Filters and Sprinkling Filters.—Filters Provided with "Oxygenators."—Handling Imhoff Sludge.—Chemical and Bacteriological Results.—Topography Compels Providing Several Plants.

By W. A. HANSELL, JR., Ass't. Chief of Construction, Atlanta, Ga.

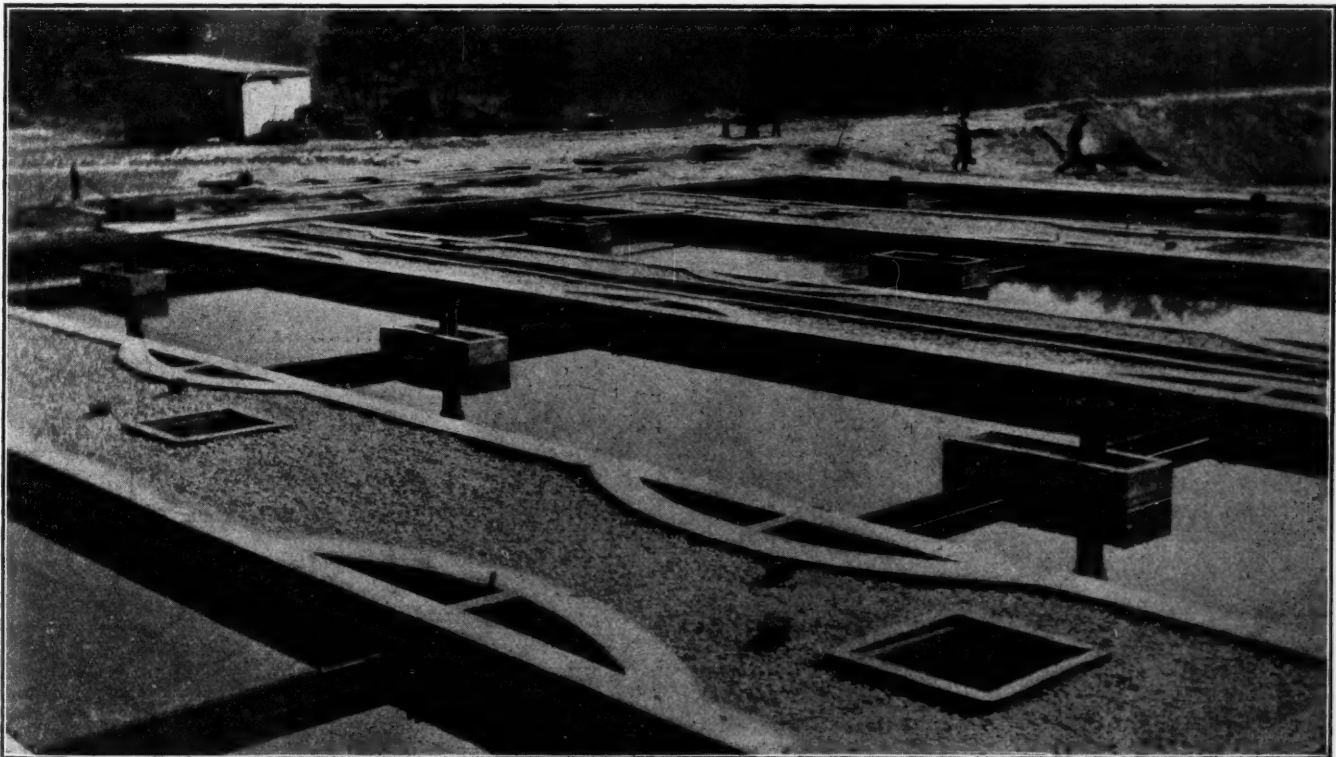
The crest of the ridge dividing the drainage areas flowing into the Gulf of Mexico from that flowing into the Atlantic Ocean passes through Atlanta, Ga., and a person may stand on the east side of Peachtree street in a shower and the drippings from his umbrella will flow to the Atlantic Ocean, then cross to the west side of the street and the drippings go to the Gulf of Mexico.

The general lay of the land is hilly, with an average slope of about 50 feet to the 1,000. Being quite broken, there are several small drainage areas, some of which come together within or near the city limits and whose sewerage can be combined naturally, but leaving others whose outfalls are so far from each other as to make it impractical to combine them.

When Atlanta first began to show signs of becoming a city there was no thought of a sewer system, but individuals would club together and put in a sewer and discharge it into some nearby small stream. As the city continued to grow this lack of method was so pronounced that it was decided to plan a sewerage system for the whole city and build along the lines adopted as the city was able from year to year. On the recommendation of Capt. R. M. Clayton, the city engineer, Rudolph Hering was called into consultation, and a combined system designed and adopted. This was about 1888; and until about 1910 the same formulas for sizes were used in calculating any extensions beyond those originally provided for. The plan was simply to extend the sewers as the city grew, keeping the outfalls far enough out to cause no nuisance to those living in the city. In all cases the sewers were built along some branch, the head waters of which had been taken into the sewer and the entire flow of the stream was sewage

which was discharged into the branch lower down. As long as the outside territory was comparatively valueless and was sparsely settled, this method of disposal was satisfactory; but the city grew very rapidly and the surrounding territory kept pace with the city and soon all those who lived near these sewage streams or had to cross them to reach the city became dissatisfied and wanted something done to relieve the situation. As the city was slow in tackling the problem, suits for damages were threatened and the city was obliged to act in the matter. It was impossible to reach any stream of volume to give a reasonable dilution of the sewage and so Capt. Clayton, who was still city engineer, advised that Dr. Hering be called in consultation on this problem also. This was done, and Hering & Fuller submitted general designs and estimates upon which to base a call for a bond issue to furnish the money with which to construct the plants. The bonds were voted in 1910, and immediately the location surveys and the detail drawings of the entire scheme were begun.

The general scheme was to extend the combined system trunk sewers to certain points fixed by the absence of improvements and at these points to start intercepting sewers which should carry the sewage to the treatment plants. Unwillingness to provide enough money for this trunk sewer work left these sewers too far inside the limits in several cases, but the county has since come to the aid of the city and is now at work extending these trunks to the points originally advised. The plan was to put in an interceptor of sufficient size to care for not less than eight times the normal flow of sewage and in case of storm to let the balance of the flow go down the natural run-way. This allows the



IMHOFF TANKS IN OPERATION. PEACHTREE CREEK PLANT.
Notice Cleanliness of Tanks and Surroundings.

first water of the storm, which carries droppings and other street debris, to go to the plant and by the time the storm has reached such proportions as to give eight times the normal flow in the trunk sewer, the system has been thoroughly flushed out and is clean and the sewage so dilute that there is no nuisance caused by letting it flow in the old run-way, especially as it is further diluted by the storm water already in the old stream bed.

The different drainage areas were combined where possible, the sewers being brought together either by interceptor or combined trunk, and were ultimately reduced to three large areas which each required a plant, and four smaller ones which could be cared for by pumping over into one of the large areas or by a small separate plant. The three large areas discharged respectively into Proctor creek at the rate of 3,000,000 gallons per day; Intrinchnent creek at the rate of 5,000,000 gallons, and Peachtree creek at the rate of 8,000,000. The interceptors vary in length from about 2 miles to the Proctor creek interceptor to nearly 4 miles for the one to the Peachtree plant. The plants are located at such points as to give enough fall from the outfall of the interceptor to the creek into which the effluent from the plant is discharged to run the plant by gravity alone, and in addition the plants were so located that the nuisance would be a minimum should the operating results not be up to our expectations.

The Peachtree creek and Intrinchnent creek interceptors are 4 ft. x 4 ft. with semi-circular arch top and vertical sides and the bottoms are a flat V. All are of plain concrete except where the bottom of a trench was bad, when the bottom only was reinforced. In several cases it was necessary to tunnel through hills, the longest tunnel being about 500 feet. Tunneling was done only after the depth of the open trench exceeded 25 feet, and the size of the sewer was increased in the tunnels to 5 ft. wide by 6 ft. high, so as to allow of the handling of material through the completed tunnel.

Where it was necessary to cross a valley by means of a fill, the fill was made as soon as possible and well rolled in thin layers and carried to the height of the top of the sewer; then a trench was cut in the fill and water run into the trench until thoroughly soaked. This was then allowed to settle until all the rest of the job was complete when the trench across the fill was excavated to grade and the sewer put in. We got excellent results by this method and have had no trouble so far with the sewer on these fills, though the sewer is now over a year old. In some places we crossed valleys with reinforced concrete aqueducts and in one place found it necessary to build a combined aqueduct and viaduct in



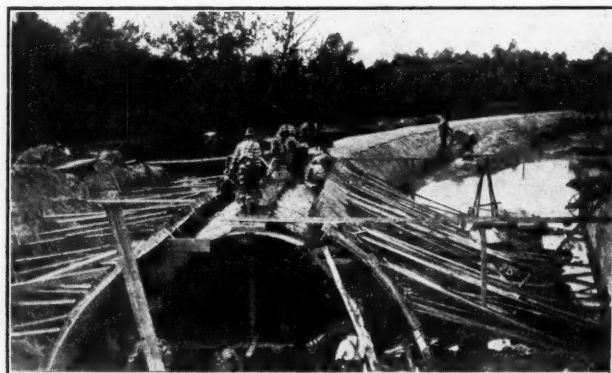
ONE OF THE AQUEDUCTS.

order to cross a stream at the most advantageous point, there being already a public road located here and we were required to carry the roadway across over our sewer. All the aqueducts are provided with expansion joints, but no other provision was made for expansion or contraction, nor have we found it needed so far.

The Proctor creek interceptor is made of lock-joint

reinforced concrete pipe of 48 inches diameter. We began making this pipe at some convenient point and hauling it to the trench on a special wagon, but found this considerable trouble, as the joints, 4 ft. long, weighed nearly 2 tons each and it was quite inconvenient handling the pipe from the top of the trench into place. We then tried making the pipe in the trench itself, merely turning the pipe down from the vertical position in which it was cast, and found this much more satisfactory. The line with this lock-joint pipe was much better than the plain concrete job, as the curves worked out beautifully with the four-foot sections, while with the plain concrete we had considerable trouble getting a good job where the forms came together on the curves. Part of the Peachtree creek interceptor is 4 ft. 6 ins. high by 6 ft. wide, as the sewage from two areas comes together about a quarter of a mile from the plant, and this is the size of the sewer under the viaduct.

At the end of the combined sewer, where the interceptor starts, is provided a cast-iron screen with the bars about four inches apart, through which the sewage drops into the interceptor. The grade of the top of the interceptor is the same as the bottom of the large sewer



PROCTOR CREEK TRUNK SEWER.

and the screens extend clear across the sewer. The first length of the interceptor is reduced in size so that there will not be too much pressure on the interceptor when the large sewer is heavily charged and the screen under several feet of head. These screens are given sufficient inclination with the flow to allow any debris which might catch on the screen to wash off into the run-way. The entire line of intercepting sewer is ventilated by the use of perforated manhole covers, the manholes being put in about every 500 feet with the barrel of the manhole built up above high-water mark.

Right at each plant there is a by-pass provided so that all the sewage can be discharged directly into the creek if found necessary at any time.

TREATMENT.

None of the streams into which the plants discharge is used as a source of water supply by other towns or cities and the aim of the treatment is to render the sewage permanently unobjectionable to the nose or the eye. It is not intended to make drinking water of our sewage, but only to treat it to such an extent that we can truthfully say we are not causing any evil odors or unsightly scum-covered pools in the streams.

The process is divided roughly into three stages. First we take out the sand and small stone, next we get out the settleable solids, and then we remove the particles in solution.

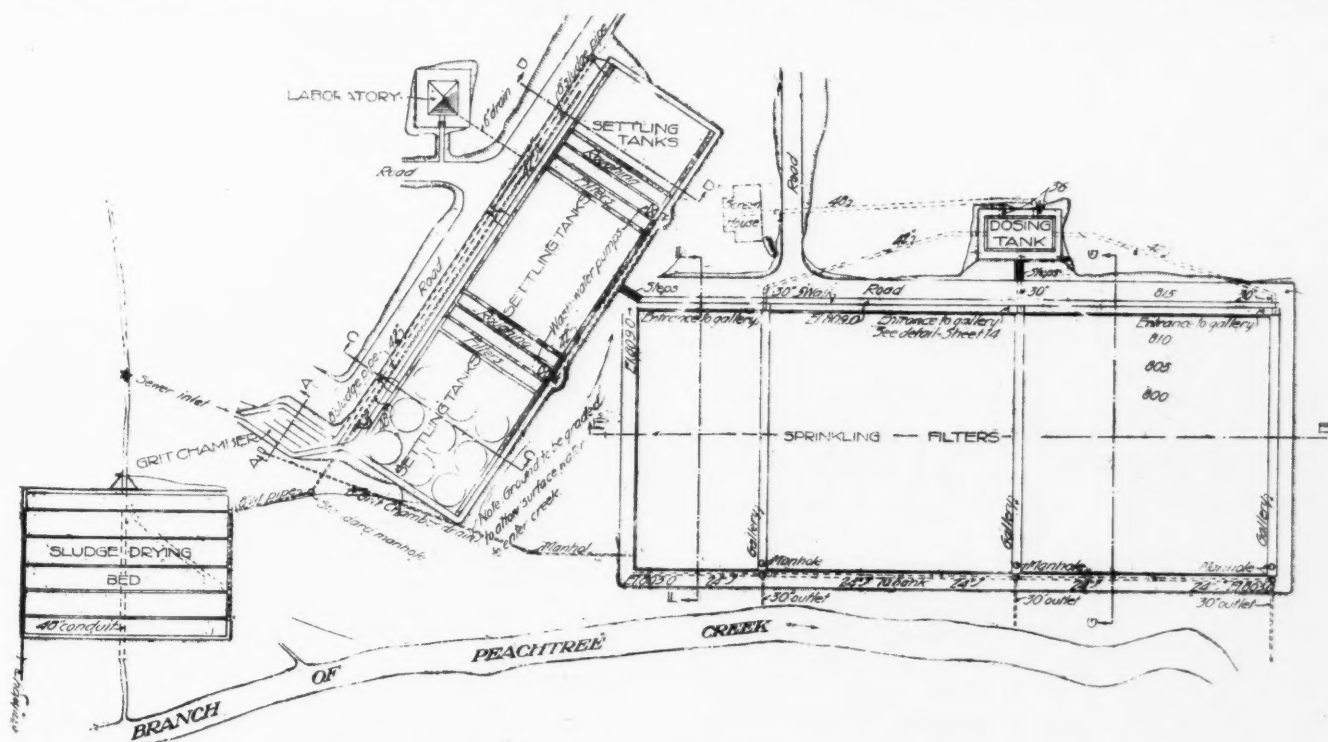
The sand removal is accomplished by a grit chamber, which is simply a pit in which the velocity is so far retarded as to cause sand and any mineral matter brought down to the plant to settle out, but without the velocity

being sufficiently retarded to cause the settlement of any organic matter. The grit chamber consists of three settling channels and a by-pass, so arranged with stop planks that any one or all can be used at one time. The plant being required to treat such a variable amount of sewage, one channel would not be adaptable enough, but with three we can secure any desired velocity of the sewage and so deposit any varying size of sand or silt we find advisable. The sewage passes through a bar screen at the entrance to the grit chamber so as to stop tin cans, wood, etc. When the plant was put in operation, we were at work on the extension of the Proctor creek trunk sewer, which followed the branch about a half mile, and a very large amount of sand was washed into the interceptor. It was found necessary to keep a laborer at work all day shoveling sand out of the grit chambers and we therefore added to the original plans a sand pit about 4 ft. x 6 ft. and 6 ft. deep, with bottoms sloping to a 10-inch valve. When this pit was sufficiently filled, the valve was opened and the sand washed into the overflow pipe and thence into the stream. Since the completion of this trunk sewer, there has been very little sand going into the plant except in time of storm. In case of storm the sand valve is opened whenever found necessary or left open enough to keep the sand moving.

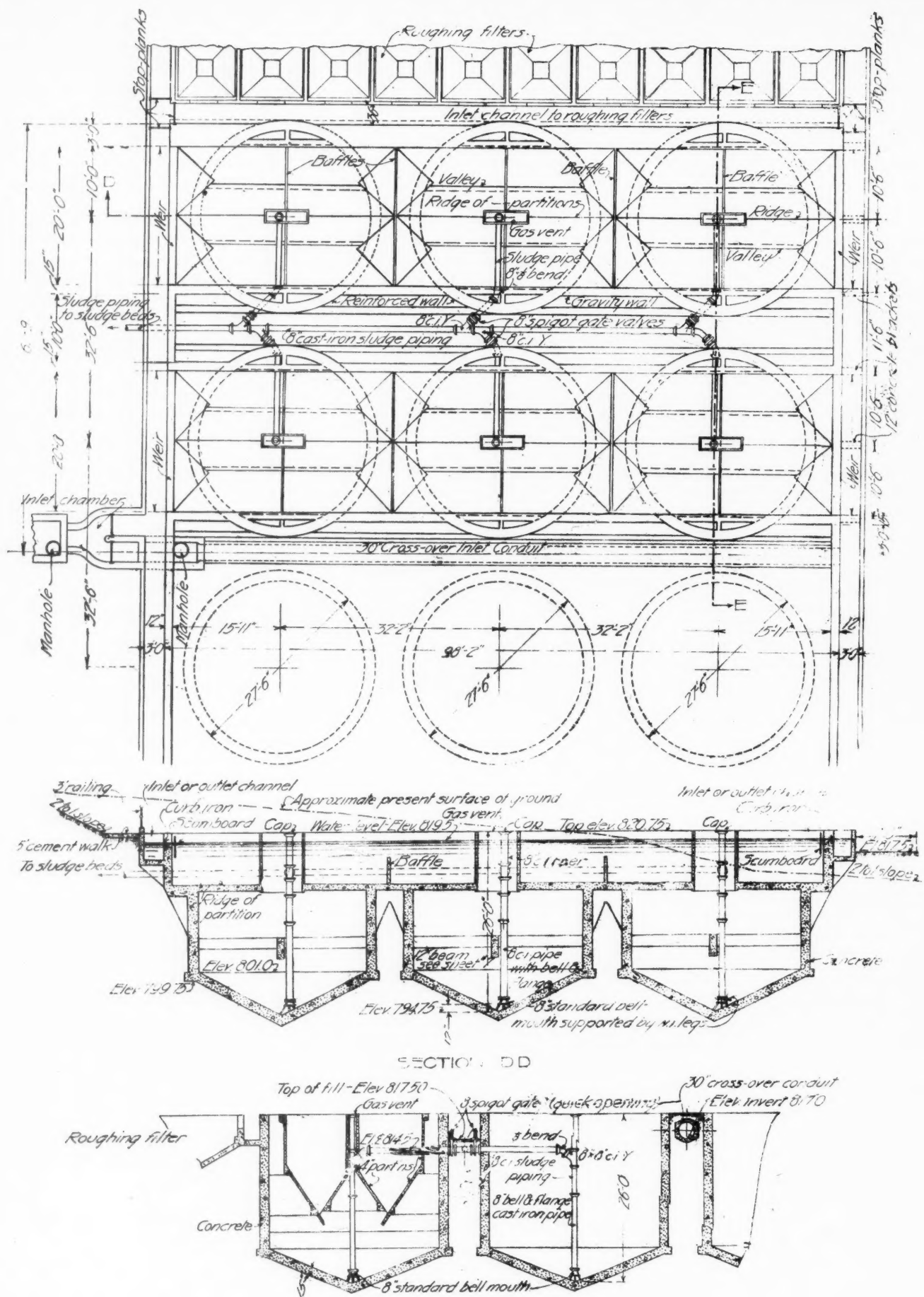
The next step in the treatment is the removal of the settleable solids, which is accomplished by the use of the Imhoff tanks. At the Proctor creek plant there are four sets of three tanks arranged so that the sewage enters over a wier at one end of each of the four sets and is discharged at the other end. At the Intrenchment creek plant there are seven sets; at Peachtree there are ten sets. These tanks are circular, 25 ft. inside diameter and 26 ft. deep, with a flow-way across the top of each set of tanks, extending from about 12 feet from the bottom up to the water line. These flow-ways are separated from the bottom part of the tanks by inclined slabs which do not meet but one over-laps the other and leaves a long slot connecting the two parts. We call the bottom compartment the decomposing chamber. Each bottom has a central ventilator and a ventilator on each side for the escape of gases of de-

composition. The bottom of each tank is an inverted cone and in its center it put a cast-iron foot piece with suitable opening for discharging the sludge. On this foot piece rests an 8-inch cast-iron sludge pipe, which has a Y-branch 6 ft. below the water level leading into the sludge discharge pipe. This sludge pipe is fitted at the top with a cap leaded in place and provided with a fire-hose connection to be used in case the sludge fails to start under normal conditions. The pipe leading from the Y is provided with a valve and discharges into a manhole in the sludge line so as to allow of immediate inspection of the sludge. A lead pipe for water pressure is run down to the foot piece and is drilled at the bottom with small holes so as to stir up the sludge when it is desired to discharge any, and another lead pipe with small openings every 18 inches is run around the top of the inverted cone bottom to make the sludge slide down to the discharge pipe. Scum boards are provided at each end of each series and baffle boards are in each tank. As the first tank in each set gets nearly all the solids settled out, it is necessary to reverse the flow in order to keep the level of the sludge about the same and in order to give the sludge in each tank time for decomposition; so a by-pass channel is provided by use of which either end may be made either the inflow or discharge. We are now reversing the flow about every three weeks and are getting out all of the settleable solids. The tanks have been in operation since the middle of last August and the sludge drawn out has been in splendid condition, having a slight odor of tar but none of sewage or decomposition. It has dried nicely and has been in every way satisfactory.

The effluent from the Imhoff tanks goes to a revolving mechanical screen, the object of which is to take out any hair or colloidal matter which did not settle in the Imhoff tanks, but which might clog the filter. The screen at Proctor creek has been found entirely unnecessary so far, as the tanks get everything which the screen could get and we have practically abandoned its use. Should the character of the sewage change and we find the screen advisable, it can then be used. At the other two plants, roughing filters will take the place of the screen. These roughing filters are of broken stone



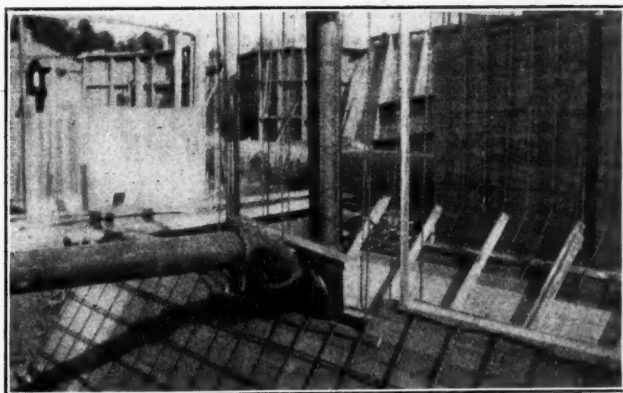
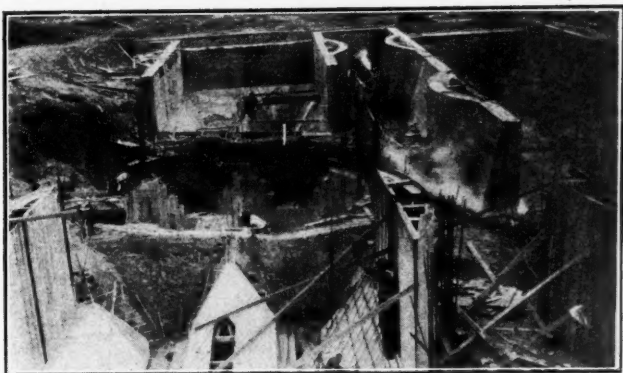
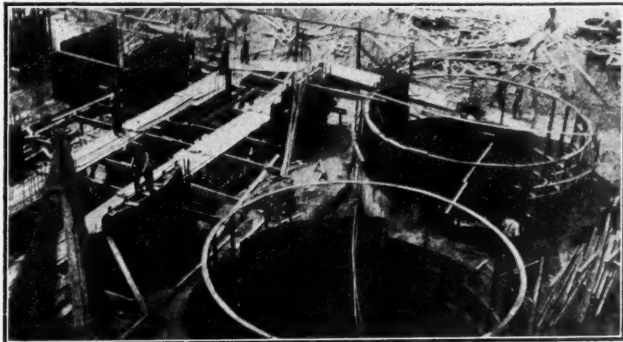
GENERAL PLAN OF PEACHTREE CREEK DISPOSAL WORKS



PART PLAN OF IMHOFF TANKS, AND SECTIONS ON DD AND EE.

resting on a perforated cast-iron base and can be cleaned by reversing the flow of sewage through them by pumping, the washings being carried back into the tank, where the screenings will nearly all settle. The revolving screen, if operated, would be a continuous expense for electric current, while the roughing filters require current only when they are being cleaned, the sewage being pumped back through the screen by centrifugal pumps.

The sewage having been freed from hair, it now goes to a tank containing a 24-inch automatic siphon, called a dosing tank, which discharges at about 9 ft. head above the sprinkler nozzles and stops at about 2 feet head. This siphon now discharges about every 10 min-

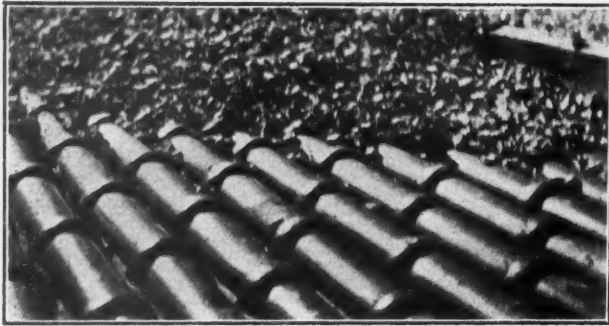


IMHOFF TANKS DURING CONSTRUCTION.

utes and the spray lasts about 3 minutes. The diminution in head causes the area covered by the spray to contract gradually so that in addition to the 7 minutes' entire absence of flow, the spray does not fall in the same place continuously. The siphon discharges into a supply pipe which feeds the 6-inch distributors on which are the nozzles. At Proctor creek the main distributors are 24-inch pipes, each feeding a half acre, while at the other plants they are 30 inches in diameter, each feeding an acre. Each distributor has a valve so that it may be

RESULTS OF CHEMICAL AND BACTERIOLOGICAL ANALYSIS AT THE PROCTOR CREEK SEWAGE TREATMENT PLANT, DURING THE MONTH OF FEB, 1913.

INFLUENT TO IMHOFF TANK																	EFFLUENT FROM IMHOFF TANK AND INFLUENT TO SPRINKLING FILTER																	EFFLUENT FROM SPRINKLING FILTER																
Date.	Temperature F.	Parts per Million					Bacteria per c. c.					Suspended Matter					Parts per Million					Bacteria per c. c.					Suspended Matter					Parts per Million					Bacteria per c. c.					Suspended Matter								
		Nitrogen as	Ammonia	Nitrites	Nitrates	Total	Volatile	Fixed	Dissolved	Oxygen	Colonies	Organic	Free	Ammonia	Nitrites	Nitrates	Total	Volatile	Fixed	Dissolved	Oxygen	Relative Stability	Colonies	Total	Colonies	Red	Temperature	Colonies	Total	Colonies	Red	Temperature																		
2	61	0.12	15.2	0.10	2.5	170	80	90	0	0	10,000	9.6	17.2	0.10	6.3	87	46	41	3.4	3.4	30,000	3.6	9.2	0.80	2.2	56	33	32	8.9	99	60,000	60,000	10,000	53	10,000															
4	61	0.10	17.2	0.08	1.3	212	94	118	5.4	5.4	40,000	9.6	22.0	0.10	1.3	81	35	46	4.4	4.4	80,000	3.6	14.0	0.60	7.0	63	30	30	7.8	99	60,000	60,000	10,000	53	10,000															
6	60	0.08	18.2	0.07	1.5	166	78	88	5.4	5.4	100,000	8.8	26.0	0.12	1.72	77	40	37	4.4	4.4	150,000	3.2	11.2	0.5	7.9	50	30	30	7.8	99	60,000	60,000	10,000	53	10,000															
7	60	0.10	17.2	0.08	1.3	156	84	56	6.1	6.1	100,000	8.8	26.0	0.12	1.72	77	40	37	4.4	4.4	150,000	3.2	11.2	0.5	7.9	50	30	30	7.8	99	60,000	60,000	10,000	53	10,000															
8	60	0.08	18.0	0.08	1.42	142	142	186	5.9	5.9	200,000	17.2	23.2	0.10	3.20	78	40	37	4.6	4.6	220,000	2.8	13.2	0.7	7.7	45	38	38	7.2	99	150,000	40,000	48	10,000																
9	60	0.16	17.6	0.16	1.94	118	88	30	5.1	5.1	100,000	16.8	31.6	0.14	2.86	72	37	35	4.3	4.3	90,000	2.8	13.2	0.9	7.7	45	38	38	7.2	99	150,000	40,000	48	10,000																
10	60	0.14	22.1	0.14	2.36	118	118	118	5.1	5.1	350,000	16.8	31.6	0.14	2.86	72	37	35	4.3	4.3	150,000	2.8	13.2	0.9	7.7	45	38	38	7.2	99	150,000	40,000	48	10,000																
11	60	0.38	32.0	0.38	1.39	130	94	96	6.2	6.2	130,000	11.6	32.4	0.08	2.92	51	42	46	3.2	3.2	180,000	2.8	13.2	0.7	7.7	45	38	38	7.2	99	150,000	40,000	48	10,000																
12	60	0.08	17.2	0.08	1.3	166	106	128	5.4	5.4	130,000	11.6	32.4	0.08	2.92	51	42	46	3.2	3.2	180,000	2.8	13.2	0.7	7.7	45	38	38	7.2	99	150,000	40,000	48	10,000																
13	60	0.08	17.2	0.08	1.3	166	106	128	5.4	5.4	130,000	11.6	32.4	0.08	2.92	51	42	46	3.2	3.2	180,000	2.8	13.2	0.7	7.7	45	38	38	7.2	99	150,000	40,000	48	10,000																
14	60	0.10	17.2	0.10	2.15	226	98	128	6.1	6.1	50,000	17.8	18.8	0.08	3.32	54	35	35	3.8	3.8	50,000	2.0	12.0	0.5	7.9	93	25	25	6.8	99	70,000	5,000	60	10,000																
15	60	0.10	16.0	0.10	3.10	238	121	114	6.1	6.1	250,000	11.1	19.2	0.11	4.16	97	42	55	4.4	4.4	100,000	2.0	10.8	0.5	9.1	93	25	25	6.8	99	150,000	60,000	60	10,000																
16	60	0.10	16.0	0.10	3.10	238	121	114	6.1	6.1	200,000	9.2	22.8	0.12	3.68	88	48	40	3.8	3.8	225,000	4.0	15.2	0.7	7.9	53	29	24	6.4	99	150,000	60,000	60	10,000																
17	62	0.10	15.2	0.10	3.10	238	140	116	6.4	6.4	50,000	9.2	22.8	0.12	3.68	88	48	40	3.8	3.8	225,000	4.0	15.2	0.7	7.9	53	29	24	6.4	99	150,000	60,000	60	10,000																
18	60	0.12	19.2	0.12	3.13	238	162	208	6.7	6.7	180,000	11.6	18.8	0.20	3.1	102	57	45	4.9	4.9	225,000	4.4	10.8	0.7	8.9	53	28	25	6.8	95	400,000	100,000	57	10,000																
19	60	0.12	19.2	0.12	3.13	238	162	208	6.4	6.4	20,000	12.8	21.6	0.12	2.18	112	54	58	4.9	4.9	225,000	3.6	15.2	0.8	7.6	47	30	30	6.8	95	400,000	100,000	57	10,000																
20	62	0.12	21.2	0.12	3.18	238	186	132	6.4	6.4	20,000	8.4	22.0	0.14	3.56	95	47	48	3.0	3.0	225,000	3.2	13.2	1.0	8.4	47	28	19	6.7	95	400,000	100,000	57	10,000																
21	62	0.12	19.2	0.12	3.30	238	156	92	4.4	4.4	20,000	12.8	21.6	0.12	3.58	95	47	48	3.0	3.0	225,000	3.2	13.2	1.0	8.4	47	28	19	6.7	95	400,000	100,000	57	10,000																
22	62	0.12	19.2	0.12	3.38	182	70	92	4.3	4.3	20,000	12.8	21.6	0.12	3.58	95	47	48	3.0	3.0	225,000	3.2	13.2	1.0	8.4	47	28	19	6.7	95	400,000	100,000	57	10,000																
23	62	0.10	19.2	0.10	2.9	186	86	162	4.1	4.1	275,000	15.6	22.8	0.16	2.24	77	37	40	3.6	3.6	300,000	2.4	14.4	0.7	8.2	59	28	32	7.1	80	125,000	50,000	58	10,000																
24	61	0.29	16.4	0.29	2.86	186	110	76	3.5	3.5	100,000	15.6	22.8	0.14	2.66	77	40	36	3.4	3.4	300,000	2.4	14.4	0.7	8.2	59	28	32	7.1	80	125,000	50,000	58	10,000																
25	60	0.32	16.4	0.32	2.86	186	110	76	3.5	3.5	100,000	15.6	22.8	0.14	2.66	77	40	36	3.4	3.4	300,000	2.4	14.4	0.7	8.2	59	28	32	7.1	80	125,000	50,000	58	10,000																
26	60	0.32	16.4	0.32	2.86	186	110	76	3.5	3.5	100,000	15.6	22.8	0.14	2.66	77	40	36	3.4	3.4	300,000	2.4	14.4	0.7	8.2	59	28	32	7.1	80	125,000	50,000	58	10,000																
27	62	0.10	13.2	0.10	3.2	132	58	74	3.7	3.7	320,000	7.6	18.8	0.12	3.58	90	31	59	2.5	2.5	200,000	3.2	10.0	0.5	6.9	50	18	32	6.1	99	150,000	40,000	61	10,000																
28	60	0.08	21.6	0.08	4.12	213	158	158	5.3	5.3	300,000	10,000	11.6	20.4	0.08	3.62	74	44	30	4.9	4.9	60,000	6.0	11.2	0.5	6.5	62	33	29	6.4	99	60,000	100,000	61	10,000															
29	60	0.10	19.5	0.10	2.54	199	112	112	4.6	4.6	250,000	11.5	21.5	0.11	2.9	83	41	41	4.2	4.2	234,222	80,277	3.17	14.4	0.64	7.51	54	23	28	7.3	95	143,234	46,671	54	10,000															



CONSTRUCTION OF BOTTOM OF FILTER.

cut off, leaving the rest of the plant in operation, in case of trouble.

The sprinkling filters have concrete bottoms which are in wide furrows, the slopes of which are covered with half pipe 6 inches in diameter with open joints and bedded in cement mortar which has been brought to a smooth surface. These half pipe drain into channels which discharge into a 24-inch pipe leading to a trap manhole and thence to the creek. The drain channels are covered with concrete slabs having open joints. At certain intervals bases are built in to hold 8-inch cast-iron pipe provided with dampers, each having a cowl on the top. These cowls have vanes on them so that the



OXYGENATOR.

opening always faces the wind and in this way air is forced down into the channels and distributed through the half pipe into the stone of the filter. The fact that the discharge pipe to these drains is trapped prevents the escape of the air by any other outlet than through the stone. The value of these "oxygenators" has not been determined as yet, because of differences of minor details in the plant now operating; but as soon as the

Peachtree plant is put in operation, the dampers on one acre will be closed so as to prevent the additional air getting in and results on this acre carefully compared with one acre working normally.

The stone in the filters is about 6 ft. deep, all the stone being of the same size, viz., $1\frac{1}{2}$ inches to $2\frac{1}{2}$ inches, and great care was exercised in trying to get it the proper size. Our experience has been that if the stone was not rigidly inspected, some would get in that were too small, and where these were not detected we have had a growing together of the bacterial film and a con-

sequent bad spot in the filter. A man with a potato fork turns these spots of stone over and the trouble disappears until the growth goes together again. Circular spray nozzles are used, and the amount of head under which they work gives a nice travel in the air for most of the drops of sewage so that the aeration is excellent. The effluent from the filters is discharged directly into the creek and is a practically non-putrescible, slightly brownish stream, which has lost about two-thirds of its bacteria, all of its offensive floating matter, and all of its odor except a slight amount carried through with the water from the gas works.

The sludge from the Imhoff tanks is run onto a sludge drying bed, which is carefully under-drained and covered with a foot of broken stone for rapid drying out.

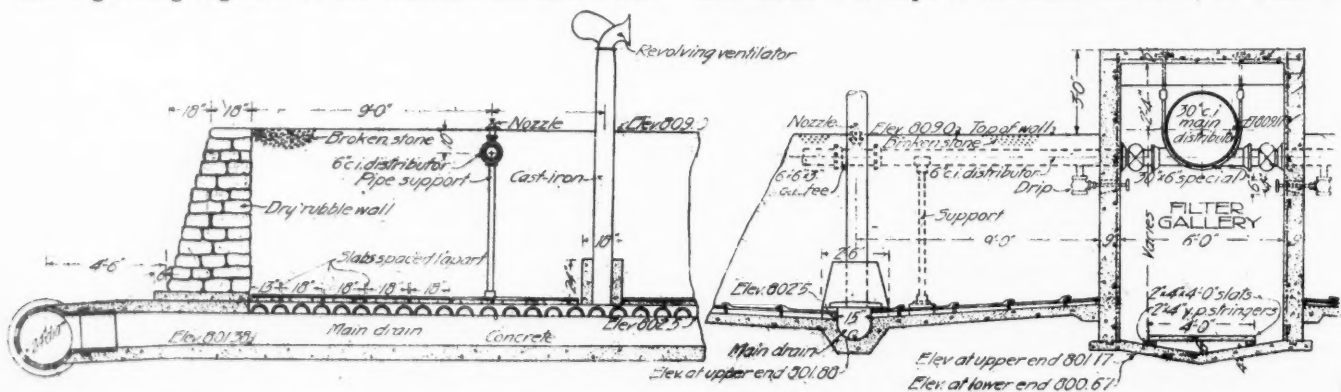


SPRINKLING FILTER IN OPERATION.

The sludge is then loaded into cars on a track, carried out into a field and dumped. We have also tried running the sludge out direct onto the ground, saving the expense of handling, and found it entirely satisfactory so far.

The plant now in operation is taking care of the night soil from about 4,500 houses in addition to the sewage it would normally have, as all the night soil wagons now discharge into a sewer leading to this plant. The class of houses from which such collections are made use a great deal of newspaper and that causes the sludge at this plant to take longer than normal for decomposition, as the cellulose is very slow in decomposing. At one time during last fall the amount of this cellulose became so great that there was not space enough in the decomposing chambers of the Imhoff tanks, and there was considerable ebullition at the gas vents. As soon as the other plants are completed, this abnormal condition will cease.

Each plant is provided with a laboratory, and we are now making complete tests of the raw sewage, Imhoff tank effluent and filter effluent. The plant was run for some time at the beginning with the idea of getting it well started and the bacterial growth in good condition, rather than trying to treat all of the sewage from the start, and our daily tests show the operation to be excellent. Settleable solids are all deposited in the Imhoff tanks. The tops of the tanks are clean, no scum or



Section Through Main Drain.

Section at Right Angles to Main Drain.

SECTIONS THROUGH SPRINKLING FILTER.

floating matter showing. The grease nearly all settles with the sludge. The gas vents are now nearly all covered with a thick, comparatively dry sponge through which the gases escape. The escaping gases are odorless. We are now spraying the tanks daily with a garden hose and they are in excellent condition.

The filters are turning out an effluent which usually runs 99 per cent. non-putrescible and on the days when we do not get such good results it is due to a chemical trades waste which will soon be eliminated. The filters are a pretty sight when the nozzles are spraying and the plant is becoming a resort for that side of town, showing the lack of objectionable features. People are now building near the plants and since the Proctor creek plant is giving such excellent results the rest of the city is clamoring for the completion of the other two plants. The property immediately adjoining the Peachtree creek plant is now being developed as a high-class residence section. Now is a most satisfactory time for a visit to Atlanta, as we have one plant in successful operation, one about three-fourths completed and one just well started, giving an opportunity to see the work in every stage from start to finish.

SLUDGE DISPOSAL IN ENGLAND

**Filter Presses, Rotary Driers, Air Drying, Distillation
Combustion, Wet Carbonizing.—Fertilizer,
Oil, Grease, Ammonia, Combustible
Gas as Products**

The sludge problem, in spite of the great advance in sewage disposal made during the past few years, has not yet been satisfactorily settled, and the satisfactory disposal of this residue from every process of sewage treatment still offers opportunity for great developments. All large cities which dispose of their sewage otherwise than by dilution are facing the problem. One of the large plants in this country often referred to as a model of most advanced practice discharges all of its sludge and sediment into the river, generally during the high water; but few large cities are so located as to make this possible. Providence, R. I., which for years had been using filter presses for concentrating the sludge from chemical precipitation and depositing the sludge cakes on low land in the vicinity of the works, began about two years ago to carry the sludge in boats to deep water in the sound or lower bay. London maintains a fleet of ships for the sole purpose of carrying to sea the sludge from its sewage.

There are unquestionably valuable materials in sewage sludge, but there may also be and usually are other substances which tend in many cases to neutralize this value or are even deleterious. The utilizing of the sludge for fertilizing has always been and is still considered as offering the most favorable field, but recently the recovery of ammonia, grease and even combustible gases has been attempted by more or less complicated processes. So far as we know there is not a single instance in this country of any of these processes being used on an operating scale.

In England the difficulty of disposing of sewage is even greater than in this country, since there are few streams in that country of a sufficient size to entitle them to the name of rivers in the United States, at least in the eastern part. Consequently, in England the research and experiments made in the utilizing of sludge are more advanced than those of the United States.

One of the processes advocated there is that known as the Watson & Butterfield, which, although it was described in the fifth report of the Commission on the

Treatment and Disposal of Sewage, has not yet been introduced by any city, we believe, although it is possible that a large plant will be erected near the city of London. In this process the sludge from precipitation tanks, containing about 90 per cent. water, is reduced to 50 or 60 per cent. water by filter pressing; after which it is dried until it contains only 20 to 25 per cent. water. The drying is accomplished either by spreading it on the ground under open sheds, or by passing it through mechanically-driven rotary cylindrical driers heated by burning the gases obtained from the sludge itself by distillation. The cost of filter pressing is said to average from 55 to 61 cents per ton of cake which contains 50 to 60 per cent. water. The cost of drying is estimated at 36 cents per ton of dry sludge containing 20 per cent. of water.

When dried to 20 or 25 per cent. water, the sludge may be easily transported by conveyors or elevators to a retort for destructive distillation at a high temperature. This retort may be of fire brick, but cast iron is preferable. It is oval in section so as to effect the best distribution of heat, is set vertically, and is slightly larger at the bottom than at the top so as to facilitate the downward movement of the sludge cake. The top of the retort is closed with an air-tight cup and cone arrangement, through which the sludge cake is fed at regular intervals. The bottom of the retort is similarly closed by a cone which can be operated to let out the spent residue from the distillation. The retort is heated by the combustion of gas in a combustion chamber and in flues passing around and up its sides, a spiral path being preferable. The volatile products of distillation are taken off toward the top of the retort through a pipe fitted to the side, the gases being drawn outward by an exhauster which maintains a slight suction in the pipes. These volatile products are then passed through a condenser and subsequently through a scrubber, which extract the moisture, oil and ammonia. The inflammable gas which now remains is passed into the combustion chamber of the retort and there burned. The heat obtained from the combustion of this gas is sufficient to maintain the retort at the desired temperature, but an auxiliary source of heat is also provided by a gas producer or furnace, which is used in starting the operation. The lower part of the retort is maintained at a temperature of 1,500 degrees to 1,800 degrees Fahrenheit. Steam is blown into the retort near the bottom and in passing through the hot zone reacts on the carbonaceous material, and in the presence of the lime in the sludge the nitrogen in the sludge is liberated as ammonia.

The products of the distillation are oil, ammonia, combustible gas and mineral residue. The oil is collected in a condenser combined with the ammoniacal liquor and is run off from the top of it by an oil-separating tank. The amount of oil obtained is much greater if a comparatively cool zone is maintained at the top of the retort. This oil is believed to be much more valuable than fuel oil. The ammoniacal liquor from the condenser and scrubbers is treated with sulphuric acid and converted into ammonium sulphate. It is estimated that the value of this ammonia should cover the entire cost of the disposal of the sewage. The gas from the distillation is used in furnishing heat for continuing the distillation. The residue contains no organic matter, but the lime and phosphates in it make it valuable as a fertilizer and it is easily reducible to a fine powder. It is suggested that it could be used in connection with the lime employed as a precipitant, or that a fair quality of cement could be made from it. This residue amounts to about 50 per cent. of the solid material present in the sludge.

At Bradford, England, grease is extracted from the

sludge, the pressed cake being then used as a fertilizer or being burned in furnaces. The sludge is lifted by compressed air from the sludge pit into open vats, where it is heated with waste steam from the engines and brought to the boiling point, at which temperature it is forced by compressed air at 100 pounds pressure into the sludge presses, where the oil and water are pressed out in the ordinary way. The oil is drawn off from the water which escapes and is barreled and converted by its purchasers into olein, stearin (used for dressing leather and the manufacture of candles), and pitch used for insulating electric cables. The success of extracting the grease from sewage has led the city to add to the plant a digester costing \$1,358 for extracting grease from condemned meats and carcasses.

In Huddersfield, sludge cakes, 80 per cent. moisture, are disposed of to a large extent by being cremated in a 2-cell destructor so arranged that all the gases pass through a fume cremator before reaching the open air. As a sufficient quantity of the drier town refuse to carry on the combustion is not obtainable, gas-works clinker and engine slack are used as additional fuel. In this city the pressing of a ton of sludge costs an average of about \$1.25 per ton for labor, lime, fuel, etc., not including capital charges or cost of power.

Huddersfield and other cities are considering the adoption of a system of wet carbonizing, the plant for which consists of a special furnace, presses, drying machinery, degreasing plant, bagging machinery and power plant. The sludge while under pressure is subjected to a temperature considerably above 212 degrees, but as there is no evaporation and the heating is recuperative, the cost of fuel is said to be reduced to a minimum. The carbonizing furnace consists of a number of tubes arranged in a horizontal battery, there being placed inside of each tube a smaller one of half its sectional area. All the inner tubes are revolved by mechanical means. One end of the battery of tubes projects into a gas-fired furnace, although any other system of heating could be employed. The sludge is conveyed to the cooler end of the outer tubes and passes through the annular space to the heated chamber at the further end, where it enters a header and is fed into the inner tubes, through which it passes back to the cooler end, where it is discharged into a tank. In this way the sludge, as it leaves the apparatus, is cooled by the entering sludge and at the same time warms this sludge, thus reducing the cost of heating it. In passing through the heated chamber the sludge is carbonized. From the carbonizer it passes to filter presses and the cakes formed by these drop into a hopper and are fed into a Ruggles-Coles dryer.

The gaseous products of combustion are collected by means of a fan and discharged into a condenser, where they are reduced below atmospheric temperature, so that the air leaving the scrubber is said to produce no offensive odor.

On leaving the dryer the sludge, which contains 5 to 8 per cent. moisture, is fed into a benzine degreasing plant, which consists of a large container with agitated paddles and the necessary storage vessels, stills and condenser, which are said to extract the grease to within 1½ per cent. The residue is then bagged and sold as fertilizer.

In Glasgow, Scotland, the pressed sludge has for a number of years been changed by what is known as the Melvin process into a powder or dust manure known as Globe fertilizer. Dublin, Ireland, is experimenting, on a small scale, with the Dickson process, which consists principally in heating the sludge in its raw state, then adding brewer's yeast, and subsequently drying it; the product being sold as a fertilizer.

At Oldham there was installed in the fall of 1912 a system invented by Dr. J. Grossmann and called by his name. In this process the sludge is pumped into specially designed draining tanks, where it is reduced to a slimy consistency, and from which it is taken by bucket elevators to a storage tank in the top of the building. From this storage tank it is moved by screw conveyors into six hoppers, each of which feeds a drying machine. The drying machines are long cylinders which are bricked in and heated by coal, in which the sludge is moved slowly from one end to the other at such a rate as to be completely dried when reaching the outlet. In this state it can be used as a fuel for creating the heat necessary for carrying on the process; but the complete process contemplates the distillation of it. Each dryer has underneath it a distillation retort into which the dried sludge passes directly from the dryer. In this retort it is mixed with a little acid, and a current of superheated steam is injected through the mass as it passes along. The superheated steam removes all grease from the sludge and is later condensed and the grease separated from the condensation water. The residue is used as a fertilizer. The plant is housed in a building 120 feet by 45 feet by 30 feet high. The dryers are on the upper floor and the distillation retorts on the lower of the two floors into which the building is divided. The ground floor also contains two steam boilers, two steam engines and other machinery. The process is absolutely automatic from the time the sludge is introduced from the settling tank to the point where it leaves the distillation retort as fertilizer, and all the labor required is in looking after the boilers and machinery. No fumes can escape to the atmosphere and there is said to be absolutely no nuisance occasioned by the process. The total cost of the plant was \$58,000.

EXPERIMENTAL PURIFICATION PLANT

Under Construction at Brooklyn, N. Y.—Imhoff Tanks, Sprinkling Filters, Aerators, Roughing Filters, Disk Screen, Sludge Digester and Drying Beds.

The purpose of this experimental plant is to attempt the solution of some rather complicated problems connected with the treatment of the sewage of the city of New York, in response to a resolution of the Board of Estimate and Apportionment appropriating \$50,000 to be expended for this object.

As it will be necessary in the immediate future to provide for the sewage disposal of a large portion of the Borough of Brooklyn, now discharging sewage into the adjacent bays and river, this experimental work will, among other objects, be directed to the study of the most practicable means of sewage treatment for the local requirements. The studies will include the most efficient relative proportions of the structure and various engineering questions connected with the design of such works.

The plant will be located at the 26th Ward sewage works, where there is an available daily flow of about 20,000,000 gallons of sewage. It may be of interest to remark that the existing sewage works completed in 1896 are a chemical precipitation plant, designed to treat 3,000,000 gallons of sewage daily, and that at present it performs an extremely inadequate service.

On account of the lay of the ground at the proposed experimental plant, it is necessary to pump the sewage used in the plant, about 1,250,000 gallons per day in all, for which a 6-inch centrifugal pump is provided. As compressed air will be required in the aeration studies,

a compressor is called for capable of delivering 85 cu. ft. of free air per minute. The sewage is pumped through a quieting tank, the water line in which will enable every part of the plant to receive its supply by gravity, graduated orifices being placed in each supply line to regulate the amounts delivered to the various units. The sewage, after passing through the various experimental processes, is finally discharged by gravity into the main outfall sewer from the 26th Ward sewage works.

The plant consists of Imhoff tanks, sprinkling filter beds, tank aerator, siphon aerator, aerating sprinkling filter, settling tanks, sludge digestion tank, gravel strainer or roughing filter, sludge drying beds, and a screen of the disk design, similar to that used in Dresden, Germany, known as the "Riensch-Wurl Patent Separator schiebe." A chemical and bacteriological laboratory is also provided.

Some of the details relative to the plant are: Imhoff tank No. 1; depth, 30 ft.; diameter, 15 ft.; capacity of sedimentation chamber, 1,610 cu. ft.; sludge reducing chamber, 2,500 cu. ft.; direction of flow, horizontal; capacity of tank at 2 hours' retention, 150,000 gallons daily; one hour retention, 300,000 gallons daily; and 450,000 gallons daily at 40 minutes' retention.

Imhoff tank No. 2: depth, 21.67 ft.; diameter, 15 ft.; capacity of sedimentation chamber, 1,113 cu. ft.; sludge reducing chamber, 1,667 cu. ft.; capacity of tank at 2 hours' retention, 100,000 gallons daily.

Imhoff tank No. 3: depth, 13.25 ft.; diameter, 15 ft.; capacity of sedimentation chamber, 557 cu. ft.; sludge reducing chamber, 833 cu. ft.; capacity of tank at 2 hours' retention, 50,000 gallons daily.

The sprinkling filters are 15 feet square; effective depth of stone, 10 ft.; trays placed at 6 ft. 7¼ in. and 8½ ft. depth for sampling. Each bed has an effective area of .005 acre.

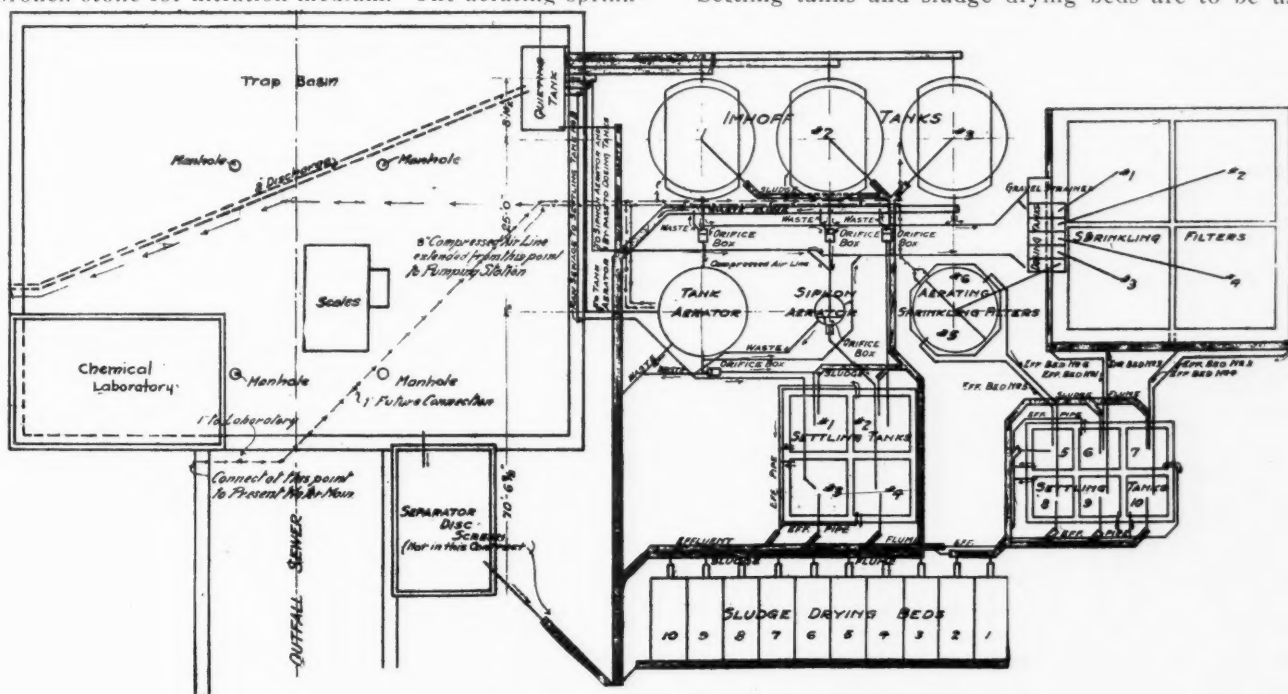
The filters will be dosed by means of dosing tanks, each provided with a 5-inch Miller siphon. A gravel strainer or roughing filter is provided in such manner that the flow coming to the dosing-tanks can be run through it or not, as desired. A study will be made to determine the most advantageous size and depth of broken stone for filtration medium. The aerating sprink-

ling filter will be 12 ft. in diameter, with effective depth of stone which may be varied up to 16 ft. This filter will be placed within a tank divided vertically, with an air-tight partition, so that comparative observations can be made with and without forced aeration of the filter. A grid for distributing the compressed air will be placed at the bottom of each division. The dosing will be the same as in the case of the other filters.

The tank aerator is designed to continue the experiment undertaken several years ago by Col. William M. Black and Prof. Earle B. Phelps at the 26th Ward sewage works, for the purpose of determining the effect which may be secured by discharging compressed air into raw sewage. (See MUNICIPAL JOURNAL for August 16, 1911.) The design shows a tank 12 ft. in diameter and 20 ft. in depth between the sewage inlets and outlets. The sewage enters at the top of the tanks just under the head of the water line and passing downward through the deflectors, is taken off at the bottom, where there is a grid for supplying compressed air, which will be discharged into the sewage in an upward direction.

The siphon aerator is an apparatus for aerating sewage proposed by the late C. C. Beddoes, who obtained a patent covering the method and application to sewage treatment. It consists, essentially, of a pipe, into the top of which sewage falls by gravity, carrying air with it and passing downward with a considerable velocity to such depth that the air becomes compressed, and the sewage exposed to it takes a greater proportion of air, as the pressure in the column of sewage increases in proportion to its depth; so that the volume of air absorbed will be proportional to the height of the column. A pipe 4 inches in diameter extends downward 130 ft., for the upper 30 ft. through a 4-ft. diameter tank, and for the remaining 100 feet inside an 8-inch diameter pipe. The sewage is admitted at the top of the 4-inch pipe, passes downward through the same and rises in the annular passage between the outside of the 4-inch pipe and the inside of the 8-inch pipe and up through the 4-foot diameter tank, from which it flows to a settling tank. The capacity of this aerator is 169,500 gallons per day at a velocity of 3 ft. per second.

Settling tanks and sludge drying beds are to be used



GENERAL PLAN OF EXPERIMENTAL PLANT.

in connection with the above mentioned apparatus. The experiments will also include sewage sedimentation and sludge digestion in separate tanks, and determination of the amount of suspended matter that may be removed, from sewage by screens of varying fineness, of the Riensch-Wurl type.

POMONA SEWAGE FARM.

Pomona, Cal., has a population of about 14,000, which is increasing rapidly, about half of which are at present connected with the sewerage system, the balance using cesspools. There is no available body of water into which to discharge the sewage, and ten or twelve years ago a farm was put into service for disposing of it. Pomona has grown to such an extent since then that the disposal plant is much too small for present purposes, and the city considered the proposition of combining with some twenty other cities and towns in an outfall sewer to the ocean, but on account of the great expense of this, caused largely by intervening hills and the length of line required, has finally decided not to enter into the proposition, and city engineer Clarence E. Bayley, to whom we are indebted for the information in this article, thinks that the probable outcome will be the construction of a larger plant upon a more modern and elaborate scale, but embodying the farm feature, which seems to be an undoubted success.

The present plant is reached by an outfall sewer which extends for 6.59 miles beyond the city limits, by which the sewage is discharged into an open settling tank, where part of the solids are precipitated, the effluent from which is discharged into a temporary pool or reservoir (considered as an expedient), from which it is pumped to the farm. The outfall sewer is very crooked, circuiting the hills southwest of the town. The farm is about three miles from the city in a straight line, but a direct route would have required considerable tunneling. The sewer is of 12-inch vitrified pipe most of the way and has a total fall of 120.5 feet in the 6.59 miles. There is considerable slope to the farm land and there is no difficulty on account of the sewage pooling.

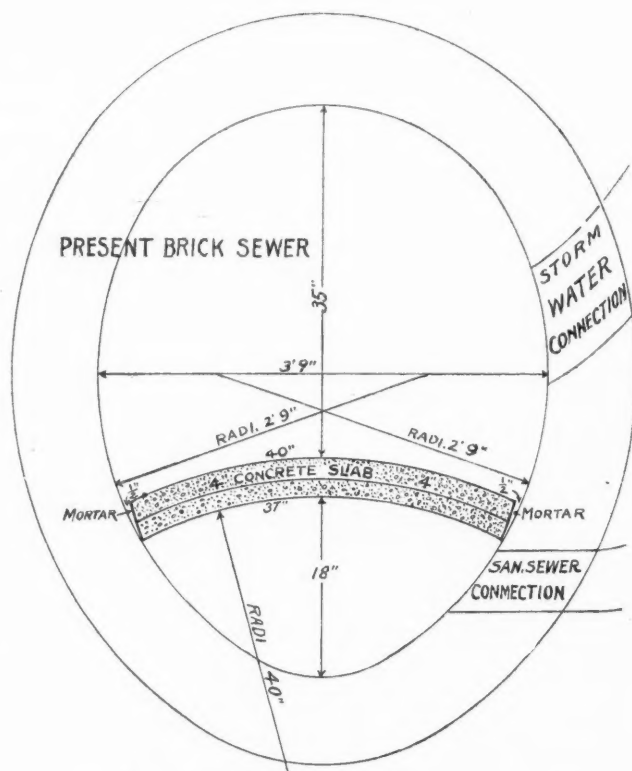
Crops are grown upon the farm, and during 1912 the receipts from these and from the hogs which are raised there were as follows: Walnuts, \$573.53; carrots, \$15; hogs, \$301.20; a total of \$889.73. In addition to this there were raised 120 tons of barley hay, valued at \$1,920, and 26 tons of oat hay, valued at \$428, which was consumed by the city teams. This gives a total value of product of \$3,237.73. The maintenance of the city system and of the outfall and farm (not including interest on bonds) was \$4,214.17. This shows a deficit of \$957.44, but as the walnut trees have not yet matured, it is believed that in a few years the receipts from the farm will more than cover all the expense of maintaining the system.

Mr. Bayley states that no odors are found at any of the numerous vents on the outfall line or at the farm, but he fears that this might not be the case should a septic tank be used. By precipitating the solids the effluent can be distributed through ordinary irrigating tile, and what is not used on the city farm could be sold for irrigating adjoining lands, irrigating water being worth about \$1,000 per miner's inch.

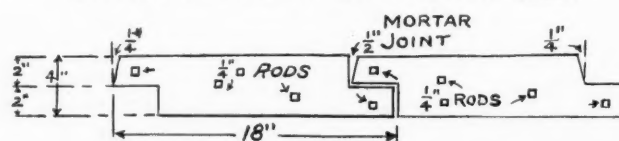
The land found most favorable for this purpose in that section of the country is a light, sandy soil. This land could be trenched and the sludge of one day covered by the trenching of the next, thus preventing odors from the solids collecting in the trenches. For this purpose he would use simple electrically handled machinery, trackage, etc., and have the whole farm under the control of an executive who should be mechanical, resourceful and systematic in his management.

DIVIDING A SEWER.

The city of Mansfield, Ohio, has just completed the changing of a section of an old storm sewer to adapt it to use in a separate system, the greater part of the old sewer to continue to be used for storm water only, but a small part for house sewage only. The sewer was of brick, oval in section, 4 feet 9 inches high and 3 feet 9 inches wide, and extended for a distance of 2,050 feet. The bottom, which was reserved for house sewage, was separated from the rest by a reinforced concrete slab placed across the sewer and serving as the floor for the storm sewer section above. This slab was arched, with a radius of 40 inches, was 4 inches thick and was so placed as to leave a maximum height of 18 inches from the invert of the old sewer to the underside of the arch. The slab was made in blocks 40x18 inches, so constructed as to lap 4 inches at the joints and thus lay 14 inches lengthwise of the sewer; the 40 inches being the length required to span the invert. Each block was reinforced with four $\frac{1}{4}$ -inch square rods. The concrete was mixed: one cement, 2 parts sand and 3 parts $\frac{1}{4}$ -inch limestone. As the work was done during the coldest winter weather, the blocks were built indoors and were steamed twenty-four hours before being taken from the molds, and were allowed to set from six to eight days after this before being used. The blocks were placed in position as shown, and all joints, both those between successive blocks and the side joints between the blocks and the sewer, were filled with cement mortar; except that under each manhole two slabs were jointed with jute and paraffine to permit of being removed when access to the sanitary sewer is desired. To further provide for this, each of these two slabs was furnished with an eyebolt. The sewer is thoroughly vented by the use of old boiler tubes topped with open grates.



SECTION OF SEWER SHOWING NEW SLAB.



LONGITUDINAL SECTION OF SLAB.

As all the work was done where little light could be obtained, even with manhole heads open, the interior of the sewer was lighted with electric lamps placed every 25 feet. The greatest difficulty experienced in the construction was the presence of gases, which at times overcame the men; but this was avoided almost entirely by the use of an electric fan placed just back of the nearest manhole, the manhole covers being kept off at all times to assist in the ventilation.

The work was begun in January of this year and finished early in March; and City Engineer E. A. Merkel, to whom we are indebted for this information, feels considerable satisfaction at the successful conclusion of this work during the winter months, especially considering the amount of storm water as well as sanitary sewage which the sewer was carrying during the work of construction. The contractor for the work was Joe Paule.

The contract price for the work was 85 cents per foot for the 2,050 feet of slab work; \$25 each for storm and sanitary connections, and \$35 for each manhole complete. A few extras brought the total cost up to \$3,000.

SEWAGE PUMPING AT LYNN, MASS.

By W. L. VENNARD, City Engineer.

The sewage of a low lying district of Lynn, Mass., near the harbor front in the vicinity of Washington street has been pumped for three years by an installation in a concrete chamber of three centrifugal pumps, motor driven. The quantity of sewage to be pumped was not large enough to warrant the installation of a permanently attended station. The outfit is self-controlling, and is entirely below the street surface, all being enclosed in a reinforced concrete waterproof chamber, the bottom thereof being 9 inches below mean low water and 19 feet 6 inches below the street surface. A sump hole 16 inches in diameter, 2 feet deep, fitted with a water ejector, drains the chamber. The concrete used in the chamber was of one-two-three mixture. Reinforcement of the roof and the wall nearest the sidewalk was made necessary by the nearby building and the slippery nature of the soil. The side wall was made 30 inches thick and located within 9 feet of a side of a 6-story factory. Hydrolithic waterproofing was applied to the walls and bottom. Sewage is delivered to the pump chamber through a $2\frac{1}{2} \times 5\frac{1}{2}$ -foot inlet, penetrated at its bottom by the pump suction pipes. A float chamber just outside the machinery room contains the necessary connection to switching devices which control the current to the motors. The sewage is raised by the pumps 10 feet 3 inches and delivered to a cast iron pipe running to an intercepting sewer. The pumping equipment consists of one 6-inch and two 12-inch class "C" Lawrence centrifugal pumps, direct connected respectively to one $7\frac{1}{2}$ -horse power General Electric induction motor running 900 r.p.m. and two larger ones to 25-horse power motors of the same make running 600 r.p.m. These motors are wound for 550 volts alternating current with a frequency of 60 cycles.

The rise of the floats automatically starts the various motors. The starting resistances are connected externally to the motor rotors and are actuated by solenoids in a step by step motion. Formerly the motors and pumps were mounted on the base of the chamber, but lately the motors have been lifted 7 or 8 feet above the floor because they have been flooded out several times. The motors are protected by conduit circuit breakers and enclosed fuses. A 2,300-volt service transformed to 40 kw. capacity is furnished by the Lynn Gas & Electric Company. The usual sliding scale price for electrical power, costing us net generally about three cents per kw.-hour,

is used. Three floats are used to start the motors and stop them, a fourth being connected with a Winslow indicator, showing at the City Electrical Department's headquarters the height of the sewage in the well-hole at all times, also the time each pump starts and how long it runs. The chamber is electrically lighted from a separate supply from the power service. From the fact that trouble is recorded at our department station on the instant, attention can be given to it because there is always some one in attendance in the fire-alarm apparatus room, where the recorder is installed.

The two large pumps are of 4,500-gallon per minute capacity. The small one has a capacity of 1,000 gallons per minute at 870 r.p.m. The contract price for installation of this electrical apparatus was \$4,500. The plant has proven to be an economical one, principally from the fact that it requires only a few moments a day of the attention of one man. Being below ground, it doesn't have to occupy any taxable land space. No means are at hand for giving the cost price of lifting this sewage. We don't know how much is lifted and therefore can't tell how much it costs. In 1911 and 1912 the electrical cost was about \$800 per year. At more than one storm this apparatus worked under water until such time as the water level rose to the switches, at which time short-circuiting took place.

SEWAGE PUMPING AT RIDGEWOOD, N. J.

By F. W. SIMONDS, Village Engineer, Ridgewood.

The village of Ridgewood, N. J., is a residential suburban town with a population of about 6,000. It is situated on the main line of the Erie R. R., 22 miles from New York, in the foothills of the Ramapo Mountains. The town, being residential, is not compactly built. A watershed running north and south divides the town into two parts. The disposal plant, consisting of settling basins, septic tanks and contact filter beds, is located in the south part of the town and on the east of the ridge. A total of 9.7 miles of sewer lines carries the sewage from the east part of the town to the disposal plant by gravity. The sewage of the west side, however, carried in 4.8 miles of 8-inch pipe, has to be pumped over the ridge and into the gravity system.

This pumping plant is located at a low point on this side of the town. The building is of brick, 19 feet by 24 feet. The pump pit is outside the building, about 12 feet x 15 feet x 5 feet deep, built of concrete and covered with a wooden roof. The pumping equipment is in two units: one consisting of a 15-horse power Century electric motor and a 7 in. by 8 in. Goulds single-acting triplex plunger pump designed for 43 pounds pressure. The other unit consists of a 25-horse power Century electric motor and a duplicate Goulds pump. For an emergency power plant there is installed a 25-horse power Fairbanks-Morse gasoline engine.

The various compartments of these units are belted through a countershaft having a shaft clutch at its center, so that, if necessary, the motor of one unit can be used with the pump of the other one. The capacity of these pumps under normal conditions is about 80 gallons per minute. The entire sewage, sludge and all, is pumped. In order to thoroughly clean the discharge main and reduce the frictional head as much as possible, we have installed a small Goulds air pump, which fills an air storage tank. When the desired pressure has been reached the air is suddenly discharged into the force main by means of a 3-inch sliding gate valve operated by hand.

The force or discharge main is 6-inch iron pipe with

bell and spigot joints, lead calked. Its length is 3,350 feet, and the actual difference in elevation between pump and point of discharge into gravity system is 87 feet.

The pumps are started when the pump pit is full and are stopped when the pit has been emptied, by an automatic cut off actuated by a float in the pit. As a general rule, one unit is worked days and the other one nights. Under normal conditions a pump empties the pit in about 60 minutes and rests about 30 minutes while the pit is filling, giving ample time for the motor to become cooled. An average of about 80,000 gallons daily are

handled at this point. Two men are stationed at the plant, working in 12-hour shifts. The day man is a machinist at \$2.25 a day and the night man a common laborer at \$1.75 per day. The electric power is bought from the Public Service Electric Co. on a sliding scale of rates depending upon horse power of motor and amount of current consumed. Under normal conditions the cost of power per month is from \$40 to \$50 at approximately \$0.07 per kilowatt hour. The cost of supplies, such as oil, grease, etc., is small, probably not over \$10 per month.

SEWERAGE SYSTEMS IN AMERICAN CITIES

Amounts and Kinds of Sewers Laid in 1912 in More Than Four Hundred Cities—Flushing and Cleaning—Pumping Plants—Methods of Treatment—Catch Basin Cleaning and General Maintenance.

The figures from over 400 cities which are given in the tables published in this issue show considerable activity throughout the country in the construction of sewers. During the year 1912 there were laid, in the cities reporting, over 8¾ million feet of sewers, or about 1,659 miles. The same cities report in use at the beginning of this year 20,966 miles; but as quite a number do not give the total mileage, stating that the city has no record of the same, it is probable that the total should be nearer 25,000 miles. As the cost of constructing these sewers would average at least \$10,000 a mile, this would give the value of the sewers laid in these cities as at least \$250,000,000.

Of the sewers laid last year, about 89 per cent. were of vitrified pipe. The next largest amount was of concrete built in place, about 4½ per cent.; about 3 per cent. were of brick; cement pipe comprised about 2¼ per cent., and reinforced concrete pipe about 1¼ per cent. These include practically all of the sewers built, although there were a few instances of the use of other material—in most cases of iron pipe, probably for pressure mains or inverted syphons. San Francisco used a short length of steel pipe; Groton, Conn., used 475 feet of creosoted pine wood stave pipe for an outfall sewer; Torrington, Conn., laid 820 feet of sewer of "segment blocks"; Indianapolis used "vitrified block" for some of its sewers, and Columbus, Ohio, laid 875 feet of "vitrified segment block." A short length of wood pipe was used in Cambridge, Mass., and Hoboken, N. J., rebuilt about 125 feet of wood box sewer. About 350 feet of combined stone and brick sewer was constructed in Fall River, Mass., and Hazleton, Pa., laid about 940 feet of large stone sewer. Red Wing, Minn., laid 2½ miles of sewer in tunnel; Stillwater, Minn., constructed 335 feet of 36-inch sewer in tunnel with a brick lined invert.

Of the sewers reported now in use, 6,282 miles were less than 12-inch, 5,317 miles were between 12- and 18-inch, 3,354 miles were more than 18-inch, and 6,013 miles were of various sizes which were not designated, in most cases because there were no records giving this information. Taking those systems concerning which distinction was made between the various diameters, we find about 43 per cent. of all sizes to be less than 12 inches in diameter, about 36 per cent. between 12 and 18 inches and about 21 per cent. more than 18 inches.

The total number of street inlets for storm water or combined sewers reported was 290,879, of which practically 90 per cent. were provided with catch basins and 10 per cent. were without catch basins. Several of the cities reported that all their new inlets are being built without catch basins, as they give better satisfaction,

SEWER FLUSHING.

One hundred and ninety-one cities, or something less than one-half, report the use of automatic flush tanks, the total number of these reported being 16,140. A total of 3,600 tanks for hand flushing were reported, although there is some doubt as to whether in all cases these were special tanks and not ordinary manholes used for this purpose.

In the method of operation of flush tanks, we are somewhat surprised to find the frequency with which these discharge in a great many of the cities. The majority of those reporting the frequency state that the tanks operate daily, but two flushings per day are reported in three cases, three flushings in one case, six in one case and eight in two cases. The enormous amount of water which is wasted by the discharging of a considerable number of flush tanks from three to eight times a day is a matter which deserves serious consideration, since it hardly seems possible that such frequent flushings are necessary.

A few cities report their automatic flush tanks are not in use. In Portland, Ind., three are "out of order." Fostoria, O., reports "Cannot state number; however, they are not in operation." In Lead, S. D., there is one, "not in use." In Dallas, Tex., there are 29, "not used." Dayton, O., has 1,050 automatic tanks, but which are flushed about once a week by hand.

In Watertown, S. D., the water used by the 42 automatic tanks is metered, and is the main item of expense in maintaining the sewer system.

Fulton, N. Y., employs a sewer inspector to visit each of its 130 flush tanks twice a week, paying him \$50 a month for this service. The water used (from a municipal plant) is charged against the department at the same rate as is paid by private consumers, amounting to about \$300 a year.

Of the other methods of flushing, the use of fire hose is by far the most common, 127 cities reporting the use of fire hose, which we understand is ordinarily used directly in manholes wherever needed, although one city reports using it in lampholes and one in catch basins. In addition to these cities, there are a number of others which use both the fire hose method and some other method, these numbering six. Six cities report a connection leading from the water main to the flushing tank, the discharge from which is controlled by a valve in the tank, as their only system of flushing, while two report the use of this in some cases and of fire hose in others. Ten close valves in the flushing manhole or insert plugs in the openings, which are opened or removed after the

(Continued on page 487.)

TABLE NO. 1.—SEWERAGE SYSTEMS IN AMERICAN CITIES.

CITY.	Sewers Built During 1912					Miles in Use			Street Inlets		Auto- matic flush tanks.	Tanks for hand flush- ing.
	Vitrified clay pipe, feet.	Cement pipe, feet.	Rein- forced concrete pipe, feet.	Concrete built in place, feet.	Brick, feet.	Less than 12-in.	12-in. to 18-in.	More than 18-in.	With catch basins.	Without catch basins.		
Alabama:												
Gadsden	1,150	.....	.....	.....	.....	59.2	3.0	.....	.....	.....	.....	.....
Montgomery	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	32	.....
Talladega	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arizona:												
Douglas	.....	.....	.....	.....	.....	13.0	1.0	.....	.....	.....	42	.....
Phoenix	.....	.....	.....	.....	.....	54.0	3.0	6.5	15	4	160	.....
Arkansas:												
Fort Smith	23,760	.....	7,920	.....	.....	49.5	10.9	14.1	.....	430	126	.....
Helena	1,734	.....	.....	.....	.....	10.8	0.9	0.6	10	40	52	.....
Jonesboro	3,000	.....	.....	.....	300	20.0	.....	.....	30	28	.....	.....
Pine Bluff	18,500	.....	.....	170	35	27.0	8.5	8.9	197	.....	137	.....
California:												
Fresno	35,100	.....	.....	.....	.....	53.0	11.4	10.5	.....	.....	.....	50
Marysville	.....	.....	.....	.....	.....	19.0	0.5	1.0	220	12	25	.....
Oakland	416,424	.....	.....	13,342	.....	365.8a	.....	.....	b	b	.....	.....
Pasadena	406,560	.....	.....	.....	.....	117.2	.....	.....	.....	.....	450	.....
Petaluma	5,996	.....	.....	.....	.....	15.0c	3.0	1.5	.....	.....	1	.....
Pomona	5,874	.....	.....	.....	.....	19.0	7.6	.....	.....	.....	36	.....
Riverside	13,947	.....	.....	.....	.....	40.0	.....	1.4	.....	.....	63	.....
San Bernardino	7,920	.....	.....	.....	.....	41.0	2.0	.....	.....	.....	331	.....
San Francisco	114,522	.....	.....	16,753	.....	.....	.....	.....	20,000c	.....	.....	.....
Santa Ana	20,000	.....	.....	.....	.....	20.0	2.0	.....	.....	.....	90	.....
Santa Rosa	6,000	.....	.....	.....	.....	10.0c	4.0	3.0	50c	10c	.....	.....
Colorado:												
Boulder	434	1,800	.....	.....	.....	20.5	1.1	.....	.....	.....	.....	.....
Colorado Springs	.....	1,300	.....	.....	.....	69.5	5.2	2.6	57	.....	37	55
Denver	488,242	.....	.....	.....	.....	126.0	75.0	369.0	4,214	.....	590	.....
Fort Collins	500	.....	.....	.....	.....	15.0	9.0	.....	10	.....	.....	.....
Grand Junction	4,000	.....	.....	.....	.....	16.0	4.0	.....	.....	.....	30	.....
Pueblo	6,916	.....	.....	.....	.....	95.1a	.....	.....	b	.....	158	.....
Trinidad	18,242	.....	.....	.....	.....	10.0	4.0	.....	40	.....	30	.....
Connecticut:												
Ansonia	33,612	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bristol	5,908	.....	.....	.....	.....	14.7	2.6	2.5	.....	.....	.....	.....
Danbury	4,474	.....	.....	.....	.....	27.0a	.....	.....	.....	.....	.....	.....
East Hartford	3,800	.....	.....	.....	.....	7.0	2.8	2.2	1	.....	16	.....
Groton	9,306	.....	.....	.....	.....	1.4	0.3	0.2	.....	.....	.....	.....
Hartford	18,300	.....	.....	853d	805	129.0a	.....	.....	.....	.....	.....	.....
New Britain	11,234	.....	.....	.....	.....	15.0	54.0	21.5	660	215	.....	.....
New Haven	6,270	.....	.....	202	.....	0.9	73.6	46.8	2,644	114	.....	.....
Plymouth	.....	.....	.....	.....	.....	0.5	.....	.....	1	.....	.....	.....
South Norwalk	3,000	.....	.....	.....	.....	.....	.....	.....	120	.....	3	.....
Torrington	6,412	.....	.....	70,000	.....	19.0	7.2	2.5	b	.....	.....	.....
Wallingford	2,000	.....	3,600	.....	.....	.....	.....	.....	.....	.....	.....	.....
Delaware:												
Wilmington	15,821	.....	300	600	540	109.3a	.....	.....	1,932e	.....	10	.....
Dist. of Columbia:												
Washington	126,679	.....	.....	20,685	.....	.....	492.5f	126.0g	4,889	.....	142	.....
Florida:												
Gainesville	1,600	.....	.....	.....	.....	8.0	3.0	.....	12	.....	31	.....
Tallahassee	1,900	.....	.....	.....	.....	12.0	0.7	.....	18	.....	38	.....
Georgia:												
Augusta	21,000	.....	.....	.....	3,600	48.0	12.0	9.0	2,150	50	52	.....
Griffin	16,000	.....	.....	.....	.....	15.0	3.0	.....	160	.....	.....	45
Idaho:												
Boise	49,000	.....	.....	.....	.....	41.5	5.4	6.8	.....	.....	128	.....
Coeur d'Alene	.....	.....	.....	.....	.....	12.0	2.0	.....	35	.....	18	.....
Illinois:												
Alton	3,000	.....	.....	.....	.....	.....	10.0	5.0	300c	50c	.....	.....
Aurora	20,380	.....	.....	.....	.....	32.0	22.0	10.6	1,500	10	17	240
Belleville	37,000	.....	.....	.....	.....	.....	23.0	10.0	2,000	.....	.....	.....
Berwyn	9,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bloomington	10,195	.....	.....	.....	977	1.4	41.8	12.1	.....	.....	3	.....
Canton	3,400	.....	.....	.....	.....	24.0	2.0	3.0	425	.....	.....	.....
Chicago	368,679	.....	.....	54,294	.....	.....	1361.0h	676.1	88,040	.....	18	.....
De Kalb	500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Du Quoin	.....	.....	.....	.....	.....	3.7	1.0	0.5	.....	.....	.....	.....
Edwardsville	5,000	.....	.....	.....	.....	2.1	8.7	3.2	43	126	.....	.....
Elgin	15,156	.....	.....	630	.....	53.6	8.0	5.0	446	.....	.....	.....
Evanston	9,485	.....	.....	.....	.....	18.2	45.3	13.0	3,043	.....	1	.....
Farmer City	10,000	.....	.....	.....	.....	.....	1.0	0.9	68	.....	1	1
Galesburg	24,616	.....	.....	.....	.....	.....	39.2i	.....	.....	.....	4	.....
Hamilton	21,000	.....	.....	.....	.....	3.4	0.6	.....	.....	.....	.....	.....
Jacksonville	1,400	.....	.....	.....	.....	10.0	18.0	5.0	98	36	2	.....
La Salle	1,200	.....	.....	.....	.....	15.0	3.0	1.0	b	.....	.....	.....
Lyons	10,000	.....	.....	.....	.....	0.5	.....	1.0	132	.....	.....	.....
Macomb	.....	.....	.....	.....	.....	10.0	.....	.....	100	.....	5	5
Mattoon	11,583	.....	.....	.....	.....	.....	6.0	3.0	.....	.....	.....	.....
Moline	20,850	.....	.....	.....	.....	30.7	9.7	0.6	b	.....	1	.....
Murphysboro	32,000	.....	.....	.....	.....	6.0	1.0	3.5	10	6	15	.....
Oak Park	222	.....	.....	.....	.....	9.1	47.2	6.2	1,235	.....	.....	.....
Ottawa	.....	.....	.....	.....	.....	8.0	5.0	2.0	200c	350c	.....	.....
Paris	4,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	45	.....
Pekin	.....	.....	.....	.....	.....	8.5	9.2	6.0	544	.....	47	.....
Pontiac	4,100	.....	.....	.....	.....	11.0	2.5	2.5	.....	.....	.....	.....
Quincy	27,829	.....	.....	.....	.....	8.9	24.3	10.1	b	220	12	.....
Rockford	30,406	.....	.....	.....	.....	38.0	21.9	8.7	271	.....	44	.....
Springfield	13,379	.....	.....	.....	.....	b	b	70.9	.....	b	.....	1
Streator	7,205	.....	.....	.....	.....	5.0	8.0	4.0	.....	.....	.....	.....
Taylorville	5,300	.....	.....	.....	.....	12.0	4.5	.....	.....	.....	.....	.....
Waukegan	25,000	.....	.....	.....	.....	30.0c	4.0c	6.0c	b	b	50	.....
Indiana:												
Anderson	5,154	.....	.....	.....	.....	27.8a	.....	.....	.....	.....	65	.....
Bloomington	3,340	.....	.....	1,450	.....	8.5	3.0	1.5	58	11	27	6
Elwood	1,500	.....	.....	.....	.....	b	b	b	b	.....	.....	.....
Fort Wayne	25,564	.....	.....	.....	.....	0.1	72.6	26.8	.....	.....	.....	.....
Geary	22,798	.....	.....	18,614	.....	2.9	35.6	12.6	b	.....	.....	.....

For footnotes, see page 487.

TABLE NO. 1.—SEWERAGE SYSTEMS IN AMERICAN CITIES.—(Continued).

CITY.	Sewers Built During 1912					Miles in Use			Street Inlets		Auto- matic flush tanks.	Tanks for hand flush- ing.
	Vitrified clay pipe, feet.	Cement pipe, feet.	Rein- forced concrete pipe, feet.	Concrete built in place, feet.	Brick, feet.	Less than 12-in.	12-in. to 18-in.	More than 18-in.	With catch basins.	Without catch basins.		
Indiana (Continued):												
Hammond	18,765						35.6	14.3				
Huntington	1,650						2.5	14.0	140c	1		
Indianapolis	46,130		4,840	10,719	6,501	334.0ja			5,480c	2,220	93	
Kokomo	9,000			2,800								
Lafayette	1,382					20.5a			b	b	b	
Marion	3,216										16	
Mishawaka	5,102					6.8	10.6	4.6	100c	1,000c	42	
Muncie	7,065					6.0	14.0	10.0	450	8	106	
Portland	4,500										3	
Richmond	6,916		864			7.0	15.6	20.6			68	
Shelbyville	700					5.0	5.0	1.0	54	111		
Wabash	4,118					11.1	5.0	2.3	b			
Iowa:												
Albia	2,255					3.0	4.0				3	
Burlington	14,651			1,280								
Cedar Falls	4,328					12.0	3.0	5.0	80		29	1
Davenport	23,326											
Dubuque	22,728			140		34.0	4.5	13.1	600	82	12	
Clinton	14,000				1,200	27.0a						
Fairfield	59,000					10.0	6.0	2.0			43	
Fort Madison	516											
Knoxville	11,000					5.0	1.0					
Marshalltown	8,132					24.0	3.5	3.5				
Mason City	7,000					27.0	.07	0.5			4	
Muscatine	1,655					30.0a						
Oskaloosa	19,000					10.0	9.5	1.9	4	150c		23
Ottumwa	4,000				1,850	6.0c	26.0c	16.0c	500c	b		
Sigourney	49,000					6.5	3.0				36	
Sioux City												
Waterloo	12,567					20.6	20.4	12.4	830	50		
Kansas:												
Arkansas City						11.2	3.5				27	
Chanute	10,733					12.0	8.0				36	
Emporia	3,000					28.0	5.0				21	
Fort Scott	3,752		600	950		b	b				80	
Hutchinson	16,000										90	
Kansas City	39,800				100							
Manhattan	1,500					15.6	2.0	3.0	40	25	31	
Newton	2,000							0.4				
Ottawa						13.2	2.1	0.3				42
Pittsburg	5,136					18.8	9.0	1.7			72	
Rosedale	18,378			3,000		0.3	0.5	2.0	100	12	4	
Salina	10,300					14.0	4.0	1.0	275		25	
Wellington	1,250					21.0	3.0		10		31	
Wichita	126,086				120	104.4	34.0	60.0	1,215		499	
Kentucky:												
Dayton	800					4.0	2.5	1.5	155			
Hopkinsville	1,800			1,100			3.9	2.3				
Lexington	9,600					20.0	1.0	4.0	120	15	80	
Owensboro	6,860					10.0	8.0	3.0			6	
Paducah	988					47.5a					40	
Louisiana:												
Alexandria						12.0	2.0	1.0			50	
Baton Rouge						13.0	1.3	0.5			30c	2
New Orleans	172,000					372.8	22.4	31.5			2,359	
Shreveport		2,330	3,770									
Maine:												
Auburn	1,733											
Bangor	5,500					45.0a			1,150	100		
Gardner	1,580											
Portland	5,091					75.1a			1,330			
Rockland	1,300					8.0	1.7	0.4	b			
Massachusetts:												
Attleborough	103,000					20.0	3.0	12.0		6,250		
Brookline	7,010			1,220								
Cambridge	11,710			475								
Concord	1,706					7.4	0.9					
Easthampton	10,000					15.0	2.0	1.0	100c			50
Everett	6,340					39.0	3.2	3.5	91	440		
Fall River	5,702				580	0.3	49.3	26.0	1,032			
Haverhill	11,005								1,615			
Hudson	939					7.4	0.8		10			
Lawrence	4,927					45.8	10.6	19.2				
Leominster	7,999					18.0	10.1	1.7				
Lowell	10,912			312		110.0a			3,176	12		
Lynn	10,906					37.9	27.6	18.4	1,225	12		
Medford	11,942					50.8	5.5	0.9				
Melrose	2,212					34.2	3.6	1.4				
North Adams	3,300					34.5a						
Somerville	19,558					105.9a						
Springfield	25,979			374		129.2a						511
Webster	2,400					8.0	2.5		6			
Woburn						14.5a						
Worcester	38,953			2,050							11	83
Michigan:												
Alpena	6,961			1,389k		13.4	11.4	5.2	145c	55c	1	
Battle Creek	24,000			830		18.5	6.8	11.0	15	40	1	
Boyer City	300					3.6	0.3		22			
Escanaba	1,000					18.4	2.6	0.6	224		6	
Grand Rapids	22,800			6,370							4	
Iron Mountain			1,800						55			
Kalamazoo	24,954			4,153		64.9	20.3	12.9			2	
Mt. Clemens	3,000						20.0	3.0				
Monroe	4,000											
Niles	4,770											
Port Huron						b	b	b	b	b	12	
St. Joseph	1,300											
Minnesota:												
Bemidji	340					2.0	1.6		41	53	3	
Chisholm	4,839					3.8	1.2	0.6	9			
Crookston	1,143					2.5	4.3	2.3	45		1	

For footnotes, see page 487.

TABLE NO. 1.—SEWERAGE SYSTEMS IN AMERICAN CITIES.—(Continued).

CITY.	Sewers Built During 1912					Miles in Use			Street Inlets		Auto- matic flush tanks.	Tanks for hand flush- ing.
	Vitrified clay pipe, feet.	Cement pipe, feet.	Rein- forced concrete pipe, feet.	Concrete built in place, feet.	Brick, feet.	Less than 12-in.	12-in. to 18-in.	More than 18-in.	With catch basins.	Without catch basins.		
Minnesota (Continued):												
Duluth	137,384	....	....	1,602	....	114.4a	....	....	749	1,908	....	183
Faribault	5,716	....	....	....	....	8.9	3.7	0.6	25	49	....	....
Mankato	17,468	....	....	....	....	9.6	5.0	2.2	....	....	....	....
Minneapolis	114,459	....	....	14,347	29	7.0	138.9	177.5	7,824	....	81	....
New Ulm	1,736	....	....	....	....	0.6	1.6	1.8	79	....	....	....
Owatonna	2,000	....	....	....	....	14.0	0.8	0.4	25	10	....	....
Red Wing	2,166	....	....	600	....	....	....	....	21	b	9	....
Rochester	2,774	....	....	....	....	10.2	1.9	....	....	....	....	....
St. Cloud	535	....	....	....	....	....	....	....	....	....	....	....
Stillwater	4,318	....	....	....	....	4.1	1.7	0.9	59	4	16	....
Winona	470	....	....	....	....	18.5a	....	....	12	....	1	....
Mississippi:												
Hattiesburg	1,505	....	....	....	....	10.0	2.0	1.2	....	....	21	....
Vicksburg	360	....	....	....	....	30.0	1.0	2.0	96	20	....	86
Missouri:												
Brookfield	4,620	....	....	....	....	6.0	2.2	....	....	....	16	....
Columbia	19,231	....	....	....	....	12.0	3.5	....	b	b	34	....
Fulton	1,286	....	....	....	....	5.0	2.0	....	....	....	6	6
Hannibal	24,200	....	....	4,200	....	....	....	....	....	....	....	....
Jefferson	17,000	....	....	....	....	10.0	2.0	3.0	....	....	60	....
Kansas City	177,179	9,980	3,444	28,252	....	418.2a	....	....	....	all	....	....
Moberly	21,126	....	....	....	....	....	....	....	....	....	....	....
Nevada	....	....	....	....	....	12.0	3.0	2.0	....	7	....	....
Poplar Bluff	20,000	....	....	....	....	5.0	2.0	....	22	8	....	....
St. Charles	1,211	....	....	....	....	16.0	2.0	....	....	....	70	....
St. Louis	154,094	....	....	24,532	63,611	0.7	377.8	342.2	20,000	....	....	....
Sedalia	31,000	....	....	....	....	25.0	5.0	4.0	20	10	....	....
Montana:												
Bozeman	6,000	....	....	....	....	9.2	0.6	....	....	....	13	....
Great Falls	15,415	....	....	4,461	3,573	24.0	2.3	2.2	95	....	70	....
Helena	1,400	....	....	2,000	....	35.0	2.0	6.1	....	....	100	....
Missoula	....	....	....	....	....	7.0	2.8	1.6	90	....	20	....
Nebraska:												
Columbus	....	....	....	....	....	5.0	....	....	....	....	5	....
Grand Island	4,000	....	....	....	....	15.0c	8.0c	....	5c	....	32c	....
Hastings	1,700	....	....	....	....	20.0	5.0	....	....	....	50	....
Lincoln	16,100	....	....	....	....	70.0	5.7	14.5	220	100	120	900
Norfolk	6,500	....	....	....	....	....	....	....	....	....	16	....
Omaha	44,000	....	....	1,003	5,140	218.0a	....	....	2,672	....	646	....
South Omaha	....	....	....	....	....	5.6	8.6	12.7	....	....	....	....
York	1,300	....	....	....	....	3.0	....	....	....	25	25	....
New Hampshire:												
Berlin	3,478	....	....	....	....	11.5	1.8	0.6	56	10	14	....
Keene	8,301	....	....	....	....	32.7	11.0	1.0	277	522	57	....
Laconia	5,265	....	....	....	....	19.7	3.1	....	....	....	831	....
New Jersey:												
Bayonne	2,860	....	....	....	....	0.7	19.4	14.2	550c	....	....	....
Camden	10,408	....	....	....	....	76.8a	....	....	1,055	....	....	....
East Orange	1,600	....	....	....	....	64.5	3.0	2.0	....	....	....	....
Hoboken	....	....	....	....	....	....	....	19.5	....	....	....	....
Irvington	8,000	....	3,800	300	....	30.0	3.0	1.0	6	....	120	....
Jersey City	1,817	....	....	....	742	....	....	....	....	....	....	....
Millville	....	....	....	....	....	12.0	1.2	1.2	....	....	20	....
Newark	22,794	....	6,971	7,362	105	287.0a	....	....	3,620	10	103	....
Passaic	3,201	....	....	....	....	35.4	8.3	1.5	241	....	251	....
Phillipsburg	....	....	....	....	....	3.2	7.1	6.0	....	80c	....	....
Plainfield	....	....	....	....	....	50.9a	....	....	23	....	137	2.8
Ridgewood	2,100	....	....	....	....	13.5	1.0	....	....	....	60	....
Rutherford	6,856	....	....	....	....	27.0c	1.0c	1.0c	8	75	125	....
Trenton	23,456	....	....	1,252	....	111.4a	....	....	399	673	322	87
Westfield	16,718	....	....	....	....	25.4	5.0	2.3	....	....	82	....
West New York	6,800	....	....	....	....	....	7.0	4.0	450	....	....	....
West Orange	2,500	....	....	....	....	....	....	....	....	....	....	....
New York:												
Amsterdam	6,937	....	....	....	....	35.1	6.2	5.2	213	57	2	....
Batavia	5,000	....	....	1,000	....	30.0	3.0	3.0	b	....	....	....
Binghamton	30,935	....	706	....	....	30.7	21.7	13.6	1,481	....	1	191
Buffalo	26,732	....	....	....	4,071	529.8a	....	....	....	....	2	....
Corning	7,384	....	....	....	....	19.9	2.1	3.7	348	....	30	....
Cortland	4,800	....	....	....	....	b	....	....	15	12	....	....
Elmira	20,322	....	....	....	....	56.4a	....	....	1,733	1,733	1	....
Fulton	5,457	....	....	....	....	21.4	2.6	0.3	80	20	130	....
Hudson	1,000	....	....	....	....	4.0	4.0	10.0	b	....	10	....
Ilion	1,200	....	....	....	....	10.0	1.7	0.8	....	....	50	....
Jamestown	18,000	....	....	....	....	50.0	10.0	5.0	....	....	100	....
Kingston	7,792	....	....	....	....	37.0	3.0	2.0	568	....	52	....
Little Falls	....	....	....	....	....	5.0	6.0	1.5	50c	....	17	....
Medina	....	....	....	....	....	b	....	....	b	b	10c	b
New York:												
Borough of Bronx	73,259	....	....	11,144	....	320.2a	....	....	3,569	608	4	....
Borough of Queens	37,529	....	20,505	....	....	240.0a	....	....	2,370	....	3	....
Niagara Falls	13,295	....	....	....	....	40.0	15.0	10.0	700	....	50	....
Norwich	5,000	....	....	....	....	10.0	3.0	0.5	4	....	30	5
Ogdensburg	1,600	....	....	....	....	....	....	....	....	....	....	....
Port Chester	8,900	....	....	....	....	11.0	3.0	1.0	340	....	30	....
Rochester	50,110	....	2,108	309	5,240	....	....	....	200	....	....	....
Schenectady	60,788	....	....	....	....	107.1a	....	....	....	b	....	....
Syracuse	30,113	....	6,862	....	....	174.4a	....	....	5,893	....	12	....
Utica	6,840	....	....	....	....	0.7	0.5	....	36	....	....	....
Watertown	10,000	....	5,000	....	....	....	....	....	....	....	....	....
White Plains	3,500	....	....	....	....	....	....	....	....	....	....	....
North Carolina:												
Asheville	1,230	....	....	....	....	5.0c	2.0c	....	....	250c	26	....
Goldsboro	1,000	....	....	....	....	25.0	5.0	10.0	....	....	75	....
Greensboro	10,000	....	....	....	....	....	....	....	....	....	....	....
North Dakota:												
Grand Forks	....	....	....	....	....	0.1	17.4	4.6	721	....	....	....

For footnotes, see page 487.

TABLE NO. 1.—SEWERAGE SYSTEMS IN AMERICAN CITIES.—(Continued).

Sewers Built During 1912												
CITY.	Sewers Built During 1912					Miles in Use			Street Inlets With catch basins.	Without catch basins.	Auto- matic flush tanks.	Tanks for hand flush- ing.
	Vitrified clay pipe, feet.	Cement pipe, feet.	Rein- forced concrete pipe, feet.	Concrete built in place, feet.	Brick, feet.	Less than 12-in.	12-in. to 18-in.	More than 18-in.				
Ohio:												
Alliance	6,000	.....	.....	.....	.....	32.0	2.0	2.0	.....	.....	65	.....
Ashtabula	8,716	.....	.....	.....	.....	22.3	5.8	2.4	149	28	87	.....
Bellefontaine	1,555	.....	.....	.....	.....	12.7	3.2	0.4	2	.....	28	.....
Bowling Green	2,000	.....	.....	.....	.....	3.0	1.0	0.5	.....	.....	20	.....
Cambridge	9,639	.....	.....	.....	.....	20.0c	2.0c	.....	.....	.....	108	.....
Canton	59,000	.....	.....	.....	11,500	87.2	20.1	11.3	.....	.....	210	.....
Chillicothe	6,238	.....	.....	.....	.....	10.6	2.0	10.0	260	12	42	.....
Cincinnati	166,072	.....	.....	1,034	14,820	17.5	215.0	152.2	483	.....	58	.....
Cleveland	87,910m	.....	.....	.....	.....	611.2a	.....	.....	16,000	.....	35	.....
Columbus	44,545	.....	1,300	.....	.....	b	b	b	b	b	170	.....
Conneaut	8,225	.....	.....	.....	.....	14.0	3.0	2.0	48	88	65	8
Dayton	100,845	.....	.....	6,500	.....	200.0	100.0	50.0	1,410	2,545	1,050	.....
Delaware	.....	.....	.....	.....	.....	.....	13.0	0.5	98	10	33	.....
East Liverpool	5,747	.....	.....	.....	.....	20.5a	.....	.....	.....	.....	66	.....
Elyria	4,850	.....	.....	.....	.....	.....	.....	.....	.....	.....	62	.....
Fostoria	6,000	.....	.....	.....	.....	b	b	b	600	.....	b	.....
Gallion	1,000	.....	.....	.....	.....	13.4	6.3	3.8	.....	224	6	74
Greenville	1,273	.....	.....	.....	.....	15.5	1.5	3.0	200c	100c	63	.....
Hamilton	17,276	.....	.....	.....	.....	35.0	10.0	10.0	.....	50	10	.....
Ironton	1,100	.....	1,060	.....	.....	8.5	5.2	3.2	.....	350c	25	.....
Lima	8,500	.....	.....	.....	.....	55.0a	.....	.....	b	b	.....	.....
Lorain	13,000	.....	.....	.....	2,600	62.0a	.....	.....	.....	.....	100	20
Mansfield	2,800	.....	.....	.....	.....	30.0	10.0	4.0	.....	.....	.....	.....
Marion	7,288	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mt. Vernon	.....	.....	.....	.....	.....	4.0	1.0	2.0	30	.....	12	.....
Newark	.....	.....	.....	.....	.....	18.5a	.....	.....	b	b	.....	.....
Niles	32,730	.....	.....	.....	.....	18.1	2.3	.....	.....	.....	70	.....
Painesville	.....	.....	.....	.....	.....	14.0c	2.0c	1.2	26c	168c	1	.....
Ravenna	5,040	.....	.....	.....	.....	18.8a	.....	.....	.....	.....	.....	260
St. Marys	.....	.....	.....	.....	.....	12.0	4.0	.....	.....	.....	.....	.....
Springfield	30,600	.....	450	.....	.....	22.8	15.2	14.6	50	82	57	121
Steubenville	16,900	.....	.....	.....	5,000	.....	23.0	5.9	350	.....	22	.....
Troy	.....	.....	.....	.....	.....	4.2	1.1	0.8	.....	.....	.....	.....
Urbana	3,200	.....	.....	.....	.....	15.0	10.0	5.0	400c	75	.....	.....
Warren	17,000	.....	.....	.....	.....	15.8a	.....	.....	30	45	52	.....
Wellsville	1,300	.....	.....	.....	500	.....	.....	.....	.....	.....	.....	.....
Wooster	6,154	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown	19,135	.....	.....	.....	1,165	10.5a	.....	.....	.....	.....	1	.....
Oklahoma:												
Bartlesville	5,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chickasha	.....	.....	.....	.....	.....	20.3	6.3	5.0	163	118	28	.....
El Reno	1,500	.....	.....	.....	.....	12.0	2.0	.....	155	12	.....	.....
Lawton	.....	.....	.....	.....	.....	23.0	1.0	.....	133	32	15	.....
McAlester	22,000	.....	.....	.....	.....	24.4	6.3	.....	50	.....	.....	.....
Tulsa	12,000	38,000	5,800	2,600	2,000	.....	.....	.....	.....	.....	8	.....
Oregon:												
Baker	.....	.....	.....	.....	.....	6.2	0.7	1.5	163	.....	23	.....
Portland	182,608	93,730	2,316	24,237	.....	272.4	103.0	18.8	b	b	7	.....
Pennsylvania:												
Allentown	.....	.....	.....	.....	.....	0.3	2.8	11.4	378c	75c	.....	.....
Athens	.....	.....	.....	.....	.....	0.7	0.7	0.3	.....	.....	.....	.....
Bloomsburg	800	.....	.....	.....	.....	12.0	0.5	.....	.....	.....	.....	.....
Chambersburg	1,000	.....	.....	.....	.....	16.0	2.0	0.7	.....	.....	78	.....
Connellsville	700	.....	.....	10,000	.....	.....	.....	.....	12	65	.....	.....
Corry	1,505	.....	.....	.....	.....	3.1	7.1	3.3	b	.....	.....	.....
Donora	6,800	.....	.....	300	.....	5.0	0.5	1.0	30	100	5	.....
Du Bois	4,102	.....	.....	.....	.....	9.3	3.3	1.0	.....	.....	4	.....
Easton	114	.....	1,034	.....	.....	0.9	5.4	6.5	105	120	10	.....
Edwardsville	10,500	.....	.....	.....	.....	3.5	1.5	0.9	12	8	.....	.....
Erie	11,542	.....	.....	.....	.....	96.2a	.....	.....	.....	.....	.....	.....
Farrell	726	.....	.....	.....	.....	11.0a	.....	.....	.....	.....	.....	.....
Gallitzin	.....	.....	.....	.....	.....	1.7	0.5	2.0	30	6	.....	.....
Hanover	2,500	.....	.....	.....	.....	.....	0.5	0.5	.....	14	.....	.....
Harrisburg	13,923	.....	8,433	8,433	1,213	9.7	37.9	24.5	2,900c	50c	.....	.....
Hazleton	664	.....	.....	.....	.....	0.2	8.0	1.5	425	.....	.....	.....
Homestead	.....	.....	.....	.....	.....	0.9	9.6	2.6	238	.....	.....	.....
Kingston	10,000	.....	.....	.....	.....	4.0	3.0	3.0	100	.....	.....	.....
Lancaster	19,547	.....	.....	.....	.....	12.0	16.0	26.0	.....	.....	.....	.....
Meadville	4,200	.....	.....	.....	.....	19.6	1.2	2.8	.....	.....	.....	.....
Monongahela	500	.....	.....	.....	.....	3.5	1.0	0.5	15	9	18	.....
Norristown	2,924	.....	.....	.....	.....	22.0	7.0	8.0	491	53	130	.....
Oil City	6,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburg	57,077	.....	12,725	.....	599	613.3a	.....	.....	.....	.....	.....	.....
Punxsutawney	450	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rankin	.....	.....	.....	.....	.....	1.0	4.0	3.5	60	.....	.....	.....
Ridgway	3,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sayre	.....	.....	.....	.....	.....	0.8	0.7	1.0	.....	.....	.....	.....
Sharpsville	.....	.....	.....	.....	.....	5.5	0.5	.....	18	8	.....	.....
South Bethlehem	5,000	.....	.....	.....	.....	7.0	2.0	1.0	160	40	6	.....
Titusville	4,000	.....	.....	.....	.....	10.0	3.0	3.0	200	.....	.....	.....
Warren	5,778	.....	.....	.....	.....	28.0a	.....	3.0	200	.....	.....	.....
Wilkes-Barre	6,764	.....	.....	.....	.....	48.8	12.4	15.2	b	b	.....	.....
Wilkesburg	7,155	.....	.....	.....	.....	20.0	10.0	5.0	100	.....	141	.....
York	1,426	.....	49.8	.....	.....	8.0a	.....	.....	100	150	.....	.....
Rhode Island:												
Pawtucket	3,012	.....	.....	.....	.....	.....	.....	.....	1,150	.....	122	194
Providence	8,062	.....	.....	.....	2,127	18.2	138.9	72.9	5,352	1,975	.....	.....
Woonsocket	6,782	.....	.....	.....	.....	21.4a	.....	.....	.....	.....	.....	.....
South Carolina:												
Charleston	.....	.....	.....	.....	.....	43.6	2.3	0.5	.....	.....	267	.....
Columbia	9,716	.....	.....	1,300	.....	7.0	8.0	2.0	53	60	53	.....
Sumter	500	500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Dakota:												
Lead	1,538	.....	.....	.....	.....	8.4	1.3	1.5	160	4	1	.....
Mitchell	9,150	.....	.....	.....	.....	14.0	3.5	.....	97	.....	.....	.....
Sioux Falls	115,376	.....	.....	6,658	.....	10.4	7.8	9.5	92	191	.....	.....
Watertown	.....	.....	.....	4,000	.....	15.0	2.5	1.5	47	.....	42	.....
Tennessee:												
Columbia	2,010	.....	.....	.....	.....	1.5	1.7	.....	12	.....	.....	.....
Jackson	3,285	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Knoxville	11,042	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

For footnotes, see page 487.

TABLE NO. 1.—SEWERAGE SYSTEMS IN AMERICAN CITIES.—(Continued).

CITY.	Sewers Built During 1912					Miles in Use			Street Inlets		Auto- matic flush tanks.	Tanks for hand flush- ing.
	Vitrified clay pipe, feet.	Cement pipe, feet.	Rein- forced concrete pipe, feet.	Concrete built in place, feet.	Brick, feet.	Less than 12-in.	12-in. to 18-in.	More than 18-in.	With catch basins.	Without catch basins.		
Texas:												
Corsicana	3,300					10.0c	4.0c				9	1
Dallas	121,090	3,726				172.5	8.0	7.5		716	29	
El Paso	15,544					51.6	8.2	3.2			74	
Fort Worth	42,610			6,340		146.8	19.3	6.5	2	275	1	
Laredo (n)	2,000					2.5	0.9	0.9	16		2	
Port Arthur	3,000				10,000	5.0	1.7				4	
Sulphur Springs						5.0c						
Wichita Falls	10,000					18.0	2.0	0.5		26	50	
Utah:												
Salt Lake City	51,065					144.7	16.3	14.7			896	170
Virginia:												
Danville						17.2	3.8				38	
Newport News						26.0c						
Roanoke	48,600m											
Vermont:												
Bellows Falls	400					6.0	4.0	0.5				
Barrie	2,130											
Washington:												
Aberdeen	10,930	6,500				32.1	5.4	1.5	398	8	121	
Seattle	160,745		12,900		4,300				1,700		32	
Spokane	47,837			23,760		74.0	23.7	38.6	1,321		370	
Tacoma	49,632	38,544				230.4		29.0				
Walla Walla											50	
West Virginia:												
Moundsville	140,666					19.8	3.0	3.7		85	8	
Parkersburg	4,500											
Wisconsin:												
Antigo	5,600					12.0	1.0	2.0				
Appleton	2,063			705								
Chippewa Falls						2.2	3.4	0.6	122	1	3	
Eau Claire	4,580					10.0	8.6	1.4	357		2	
Grand Rapids	5,440					1.0	11.5	1.0	b			
Kenosha	60,000						6.0c	6.0c	125			
La Crosse	21,745					1.0	28.0	6.0	1,084			
Madison	3,000											
Menasha	4,268					3.0	5.0					
Merrill	2,700											
Milwaukee	63,311				3,856		323.7	129.0	9,977			
Neenah	2,500						15.0	1.0				
Oshkosh	7,950		520									
Portage						8.0	1.0	2.0	8			
Sheboygan	2,610										2	
Superior	1,508			1,500		10.6	16.1	28.3	924			80
Waukesha	4,700					16.7	5.0	4.1	60		10	
West Allis	16,000			2,270		b	b	b	b	b		
Wyoming:												
Cheyenne	1,960					13.2	2.3					
Sheridan						8.2	1.4	1.8	90		17	
Canada:												
Edmonton, Alta.	68,000		2,000			80.0a			1,000			
Lethbridge, Alta.	38,540					18.7	6.6	3.4	101			70
London, Ont.	11,264	500				55.0		13.5	b	b		
Stratford, Ont.	4,471			500		23.0	2.0	0.5				
Toronto, Ont.	109,349		6,864	2,746	10,982	397.3a					104	
Windsor, Ont.					21,000	0.1	1.0	29.0				

a—Includes all sizes, details not available. b—No record. c—Approximate only. d—485 ft. of this has brick arch. e—Very few of these with catch basins. f—12-inch to 24-inch sewer. g—24-inch to 22-foot sewer. h—Includes all vitrified pipe. i—All sizes from 12 to 24 inclusive. j—Six or seven miles in use of which there is no record and not included in these figures. k—Concrete invert with brick arch. l—None in use. m—Includes all kinds. n—These sewers are private and county; city owns no sewers whatever.

(Continued from page 482.)

manhole has been filled with water. Three report the use of tank wagons only, and two in some cases; while three report the use of hose carts only, and two their use in some cases. Among other statements in answering this question are the following: "Five hundred feet of 2-inch fire hose, a hose cart horse-drawn, and two men flush the sewers in the old district." "All sewers below 24-inch, and in some cases 24-inch sewers, are flushed once a year; all others are cleaned and inspected." "By two horse-drawn 2,200-gallon water wagons." "One syphon under a creek is flushed by a 2-inch water line at 65 pounds pressure." One city reports the use of a sewer cleaning machine. Two report the use of rods, one in combination with fire hose from a hydrant delivering a stream under light pressure. One reports cleaning by the use of wooden balls forced through by means of water from a fire hydrant. The use of machine cleaning, rods and balls is not properly flushing, and the mention of them in a few cases was only incidental; it is probable that they are used in a great many other

cities. In one city the water department (municipal) flushes out the water mains through 4-inch connections to the sewer, thus flushing the sewer at the same time.

CLEANING CATCH BASINS.

The information received concerning the cleaning of catch basins was in general very unsatisfactory. A great many of the cities reported that no record was kept of this. A number stated that they were cleaned after every heavy rain, while a considerable number reported that they were cleaned regularly from one to four or six times a year.

At Gary, Ind., sand, which is drifted by the wind like snow, gives a great deal of trouble by getting into catch basins and sewers, sometimes completely filling a catch basin in one storm. The smaller sewers are cleaned by use of a machine made by the Northern Mfg. Co., which consists of a collapsible bucket hauled through with a cable and winch. The larger sewers, more than 4 ft. 6 in. diameter, are cleaned by means of a small boat which is loaded with eight buckets of sand and

(Continued on page 493.)

TABLE NO. 2.—MAINTENANCE.

City	Flushing		Cleanings of Catch Basins		Kind of machinery	Pumping or Lifting Sewage		Total Cost of main-tenance	Is sewage treated?	Effluent is discharged into	Amount of sewage treated	Cost of treatment in 1912
	Number during year	Cost of	Number during year	Total cost		Kind of fuel or power	Amount pumped, gallons					
Alabama:												
Gadsden	2	\$25	2	b						river		
Montgomery	b	b	b	b						creek		
Arizona:												
Douglas	2 daily	600								septic tank		
Phoenix										septic tank		
Arkansas:												
Helena	12	175			8" cent. pump	steam	240,000 daily	\$900		river		
California:												
Jonesboro	3 daily		b	b	motor pump	electric				creek		
Pine Bluff										dry branch		
Texarkana												
Colorado:												
Fresno				\$100	pump	electricity		2,000	settling tanks	irrig. ditches	7 sec. feet	\$200
Marysville			b	b				11,733	farm	tide water		
Oakland									septic tank	farm		
Pasadena	3		4c							septic tank		
Petaluma		1,224a										4,214
Pomona	2 daily		7,784	14,561	centrifugal	electricity		2,000	septic tank	ocean & farm	50 miners' ins.	
San Bernardino		12,644							septic tank			
San Francisco									septic tank			
Santa Clara												
Santa Rosa												
Connecticut:												
Ansonia												
Bristol	1	150										
Danbury												
Delaware:												
Wilmington	2	150										
Dist. of Columbia:												
Washington	9	3,592	38,760d	14,447	cent. pumps	steam	24,900 mil.	\$43,000	settling basin, screens & skimming tank	river	1,500,000 daily	2,000
Florida:												
Gainesville												
Tallahassee										creek		
Georgia:												
Griffin	50	150	15	15						creek		
Idaho:												
Boise	6 daily	5,100	12	b						river		
Coeur d'Alene										river		
Illinois:												
Alton			2c	150						river		
Belleville			1c	420						canal		
Berwyn	2		2c	108,203	cent. pumps	coal & gas	21,500 mil.	67,785	septic tanks	creek		
Canton	e								septic tanks	canal		
Chicago									septic tanks			
DeKalb									septic tanks			
Du Quoin									septic tanks	creek		
Edwardsville									septic tanks			
Evanston			2c	2,135					septic tanks			
Galesburg			1c	400						Lake Michigan		

TABLE NO. 2.—MAINTENANCE.—(Continued.)

City (Continued):	Cleanings of Catch Basins		Flushing		Kind of machinery	Pumping or Lifting Sewage		Total Cost of main- tenance	Is sewage treated?	Effluent is dis- charged into	Amount of sewage treated	Cost of treatment in 1912
	Number during year	Total cost	Number during year	Cost of		Kind of fuel or power	Amount pumped, gallons					
Illinois:												
Hamilton	98	\$343							septic tanks	river		
Jacksonville	1c	25						\$100	septic tank	river		
La Salle	2c	840							septic tank	creek		
Macomb	1c							2,360		river		
Oak Park	1 daily											
Paris	2	\$360										
Pekin	3c											
Quincy	2c											
Indiana:												
Bloomington	4c							100	tanks, beds, sprink- ling, filters, and settling basin	creek	500,000 daily	
Fort Wayne								4,872	septic tanks and filter beds	river		
Gary									experimental plant			
Huntington		5,000						900		river		
Indianapolis								262	tank & filter b	creeks	b	\$60
Lafayette	2									stream		
Marion	150	231										
Mishawaka	12							b				
Muncie	10											
Richmond	12											
Shelbyville	12											
Wabash	12											
Iowa:												
Albia									Imhoff tank & filters	dry run		
Cedar Falls	2	600							septic tank	dry run		
Centerville	1							5,500	Imhoff tanks & filters	dry run		
Dubuque	3								septic tank	stream	250,000 daily	35
Fairchild										river		
Knoxville										river		
Muscatine		200						150				
Oskaloosa	1	25						400				
Ottumwa	10											
Sioux City	b											
Waterloo	850	248										
Kansas:												
Chanute								1,200				
Fort Scott	631	1,000						1,000j				
Hutchinson	182	400										
Manhattan	10	70										
Newton	10	100						1,200				
Ottawa	730j	1,152						650				
Pittsburg	1	150										
Salina	4	8,000						15,000				250
Wellington												
Wichita												
Kentucky:												
Dayton								300j		river		
Lexington		600								stream		
Owensboro		800						4,000		river		1,000
Paducah												
Louisiana:												
Alexandria												
Baton Rouge								88,000		river		
New Orleans										river		
Maine:												
Bangor	8j	2,239						8,000		river		
Portland		2,445										
Rockland	1	4,202										
Massachusetts:												
Concord	2	121						3,290	filtration	brook	144,368,000	363.47
Easthampton	2-50	1,000						1,500	filters	river	300,000	800
Everett	2 1/2	526										
Fall River	2 3/8	10,615										
Haverhill	3 1/2							7,009				
Hudson	5	100						2,554		river		

TABLE NO. 2.—MAINTENANCE.—(Continued.)

City Massachusetts (Continued)	Flushing		Cleanings of Catch Basins		Pumping or Lifting Sewage			Total Cost of main- tenance	Is sewage treated?	Effluent is dis- charged into	Amount of sewage treated	Cost of treatment in 1912
	Number during year	Cost of year	Number during year	Total cost	Kind of machinery	Kind of fuel or power	Amount pumped, gallons	Cost of pump- ing				
Lawrence	1k	.....	1.6c	\$7,556	.....	.....	.....	.....	.....	river	.....	.....
Leominster	3	.....	6c	3,000	.....	.....	.....	.....	.....	river	.....	.....
Lowell	.....	.....	.....	2,806	Shone & pumps	electricity	.....	\$3,293	.....	ocean	.....	.....
Lynn	.....	.....	1,417	850	.....	.....	.....	.....	.....	river	.....	.....
Melrose	.....	.....	2½	8,442	.....	.....	.....	.....	.....	river	.....	.....
North Adams	.....	.....	.....	.....	.....	.....	.....	.....	.....	river	.....	.....
Somerville	.....	.....	.....	.....	.....	.....	.....	.....	.....	river	.....	.....
Springfield	26	2,668	.....	.....	.....	.....	.....	.....	.....	river	.....	.....
Webster	2	16,641	.....	.....	.....	.....	.....	.....	.....	harbor	.....	.....
Woburn	3	900	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Worcester	2	672	6,783	14,417	Shone & pumps	electricity & gas	.....	4,504	chem. precip. & filters	river	5,745,000,000	\$49,985
Michigan:												
Alpena	.....	.....	.....	.....	.....	.....	.....	.....	.....	river	.....	.....
Battle Creek	10	300	2	429	.....	.....	.....	.....	.....	river	.....	.....
Bozeman	4	40	.....	.....	.....	.....	.....	.....	.....	lake	.....	.....
Escanaba	2½	.....	2-12c	.....	.....	.....	.....	.....	.....	river	.....	.....
Grand Rapids	.....	.....	.....	.....	centrifugal	electricity	.....	.....	.....	river	.....	.....
Iron Mountain	4	.....	4c	.....	.....	.....	.....	.....	.....	river	.....	.....
Mt. Clemens	.....	.....	3c	.....	.....	.....	.....	.....	.....	river	.....	.....
Port Huron	.....	.....	10	.....	.....	.....	.....	.....	.....	river	.....	.....
Minnesota:												
Benidj	.....	.....	.....	.....	.....	.....	.....	.....	100	septic tank	lake	.....
Chisholm	.....	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....
Duluth	.....	.....	.....	.....	hyd. ejector	.....	.....	.....	277	septic tanks h	.....	.....
Fairbault	.....	.....	.....	.....	.....	.....	.....	.....	.....	river	.....	.....
Marquette	.....	.....	.....	.....	.....	.....	.....	.....	.....	river	.....	.....
Manitowish	.....	1,994	.....	2,852	.....	.....	.....	.....	29,285	river	.....	.....
New Ulm	.....	250	2c	160	.....	.....	.....	.....	.....	river	.....	.....
Owatonna	.....	45	.....	25	.....	.....	.....	.....	.....	river	.....	.....
Red Wing	.....	.....	.....	.....	.....	.....	.....	.....	.....	river	.....	.....
Rochester	.....	.....	.....	.....	Centrifugal	electricity	.....	.....	138	lake	.....	.....
Stillwater	.....	600	.....	176	Shone	comp. air	.....	1,303	.....	river	.....	.....
Winona	.....	49	2c	125	.....	.....	.....	.....	.....	river	.....	.....
Mississippi:												
Hattiesburg	.....	.....	.....	.....	rotary	electricity	.....	2,254	.....	river	.....	.....
Vicksburg	12	640	4c	300	.....	.....	.....	.....	750	river	.....	.....
Missouri:												
Columbia	.....	.....	.....	.....	.....	.....	.....	.....	.....	creek	.....	.....
Fulton	.....	.....	.....	.....	.....	.....	.....	.....	.....	creek	.....	.....
Hannibal	.....	63	.....	.....	centrifugal	electricity	.....	.....	.....	river	.....	.....
Kansas City	.....	.....	.....	.....	centrifugal	electricity	.....	.....	10,000j	river	.....	.....
St. Charles	.....	.....	.....	.....	centrifugal	electricity	.....	.....	.....	river	.....	.....
St. Louis	547	.....	24,043m	73,157n	centrifugal	electricity	150,000 hourly	4,500	.....	river	.....	.....
Sedalia	1	.....	2c	.....	.....	.....	.....	.....	.....	septic tank & filters	.....	.....
Montana:												
Bozeman	.....	.....	.....	.....	.....	.....	.....	.....	.....	river	.....	.....
Great Falls	.....	.....	4	.....	.....	.....	.....	.....	1,640	river	.....	.....
Nebraska:												
Hastings	.....	.....	.....	.....	.....	.....	.....	.....	.....	creek	.....	.....
Lincoln	5	3,120	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Omaha	12	.....	.....	.....	.....	.....	.....	.....	20,000	.....	.....	.....
New Hampshire:												
Keene	3	.....	52	.....	.....	.....	.....	.....	2,387	river	.....	.....
Laconia	2	550	.....	314	.....	.....	.....	.....	1,000	lake	.....	.....
New Jersey:												
East Orange	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Irvington	17	1,300	4c	300	.....	.....	.....	.....	9,900	.....	.....	.....
Millville	.....	.....	.....	.....	.....	.....	.....	.....	1,400	sound	.....	.....
Newark	.....	7,408	5,707	10,620	plunger pumps	steam	5,641,443,656	16,681	250j	river	1 mil. daily	1,200
Passaic	.....	.....	4c	390	.....	.....	.....	.....	70,853	.....	.....	.....
Phillipsburg	.....	.....	.....	.....	.....	.....	.....	.....	2,950	.....	.....	.....
Plainfield	10	1,084	.....	106	h	electricity	.....	.....	.....	septic tanks & contact beds	687,500,000	3,196
Ridgewood	.....	1,200	15c	200	plunger pump	electricity	70,000 daily	500	2,500	septic tanks & contact beds	1 mil. daily	1,000
Rutherford	.....	2,250	100	200	.....	.....	.....	.....	2,500j	river	600,000 daily	800
Westfield	2	440	.....	.....	.....	.....	.....	.....	1,000	filters	.....	.....

TABLE NO. 2.—MAINTENANCE.—(Continued.)

City	Flushing		Number during year	Cost of	Cleanings of Catch Basins			Pumping or Lifting Sewage			Total Cost of main-tenance	Is sewage treated?	Effluent is dis- charged into	Amount of sewage treated	Cost of treatment in 1912
	Number during year	year			year	cost	Total	Kind of machinery	Kind of fuel or power	Amount pumped, gallons						Cost of pump- ing
New York:															
Amsterdam	3½	.....	35j c	.....	.....	centrifugal	steam	3 mil. daily	.....	.....	\$8,000	Imhoff & sprink- ling filters	river	.....	.....
Batavia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	creek	.....	.....
Binghamton	.....	.....	3,000j	\$3,735	.....	centrifugal	steam	9 mil. daily	\$8,400	.....	6,194	.....	.....	.....	.....
Buffalo	30	.....	18	376	.....	.....	.....	.....	.....	.....	.....	.....	river	.....	.....
Corning	.....	\$498	2	75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cortland	.....	.....	1,200	1,802n	.....	.....	.....	.....	.....	.....	.....	.....	river	.....	.....
Elmira	104	.....	.....	900	.....	.....	.....	.....	.....	.....	600	.....	river	.....	.....
Fulton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	river	.....	.....
Illion	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kingston	.....	.....	.....	330	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Medina	2	.....	.....	495	.....	.....	.....	.....	.....	.....	.....	.....	creek	.....	.....
New York:															
Bronx	.....	.....	9,567	25,888	.....	Shone & cent.	electricity	.....	.....	.....	50,925	tanks & filters;	.....	.....	.....
Queens	.....	24,696	8,743	25,900	.....	.....	.....	.....	.....	.....	50,596	tanks & chem- ical; coarse filter; lagoons	bays	.....	.....
Niagara Falls	1	500	8,410	1,500	.....	.....	.....	.....	.....	.....	4,475	.....	.....	.....	.....
Norwich	.....	120	.....	.....	.....	.....	.....	.....	.....	.....	420	.....	river	.....	.....
Ogdensburg	.....	.....	400	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Port Chester	.....	.....	250	500	.....	.....	.....	.....	.....	.....	1,000	.....	river	.....	.....
Schenectady	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9,220	.....	.....	.....	.....
Syracuse	.....	.....	14c	6,826	.....	.....	.....	.....	.....	.....	.....	.....	creeks	.....	.....
Utica	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
White Plains	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	chemical	river	.....	.....
North Carolina:															
Asheville	6	400	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	river	.....	.....
Goldensboro	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100	.....	river	.....	.....
Greensboro	6j	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	septic tanks	creek	.....	.....
North Dakota:															
Grand Forks	1	.....	1c	.....	.....	.....	.....	.....	.....	.....	200	.....	.....	.....	.....
Ohio:															
Alliance	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	river	.....	.....
Bellevue	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bowling Green	.....	.....	20	600	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cambridge	.....	.....	.....	.....	.....	ejector	.....	.....	.....	.....	1,000	.....	stream	.....	.....
Canton	.....	.....	.....	1,800	.....	.....	.....	.....	.....	.....	4,800	.....	creek	.....	.....
Chillicothe	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cleveland	.....	11,000	17,105	12,329	.....	.....	.....	.....	.....	.....	32,000	.....	.....	.....	.....
Columbus	.....	1,700	.....	3,837	.....	centrifugal	gas & steam	2,500,000 daily	20,000	.....	.....	.....	.....	.....	.....
Conneaut	9	190	5c	100	.....	ejector	electricity	.....	.....	.....	.....	.....	river	.....	32,000
Dayton	.....	.....	.....	.....	.....	Shone	comp. air	9,000,000 daily	1,500	.....	18,000	.....	river	.....	.....
Delaware	.....	350	.....	.....	.....	.....	.....	.....	.....	.....	150	.....	river	.....	.....
Fostoria	.....	.....	2c	396	.....	centrifugal	steam	44,000,000	1,225	.....	1,621	.....	.....	.....	.....
Gallion	36	216	.....	8j	.....	.....	.....	.....	.....	.....	.....	.....	river	.....	1,380
Greenville	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lima	.....	915	2	40	.....	.....	.....	.....	.....	.....	.....	.....	creek	.....	.....
Mansfield	.....	.....	2c	.....	.....	.....	.....	.....	.....	.....	200j	.....	river	.....	.....
Mt. Vernon	.....	.....	.....	.....	.....	pump	steam	.....	.....	.....	.....	.....	.....	.....	.....
Niles	.....	.....	6	75	.....	.....	.....	.....	.....	.....	.....	.....	river	.....	.....
Ravenna	.....	.....	4c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Marys	2	150	.....	.....	.....	.....	.....	.....	.....	.....	1,500	.....	stream	.....	450
St. Marys	2 daily	.....	12c	.....	.....	centrifugal	electricity	.....	.....	.....	750	.....	.....	.....	.....
Steubenville	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	river	.....	.....
Warren	.....	200	2c	1,000	.....	.....	.....	.....	.....	.....	1,200	.....	.....	.....	.....
Wellsville	.....	350	350	350	.....	.....	.....	.....	.....	.....	500	.....	.....	.....	.....
Wellsville	.....	.....	2c	180	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oklahoma:															
Barlesville	.....	.....	.....	.....	.....	ejectors	electricity	100,000 daily	.....	.....	.....	.....	river	.....	.....
Chickasha	.....	1,000	2c	245	.....	.....	.....	.....	.....	.....	1,770	.....	river	.....	.....
El Reno	2	750	2c	150	.....	.....	.....	.....	.....	.....	1,050	.....	river	.....	.....
Oregon:															
Portland	.....	.....	65,000	11,000	.....	.....	.....	.....	.....	.....	43,096	.....	.....	.....	.....
Pennsylvania:															
Allentown	.....	.....	808	603	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Athens	3-4	.....	4-6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE NO. 2.—MAINTENANCE.—(Continued.)

City (Continued)	Flushing		Cleanings of Catch Basins		Pumping or Lifting Sewage			Total Cost of main- tenance	Is sewage treated?	Effluent is dis- charged into	Amount of sewage treated	Cost of treatment in 1912
	Number during year	Cost of flashing	Number during year	Cost Total	Kind of machinery	Kind of fuel or power	Amount pumped, gallons					
Pennsylvania												
Chambersburg	1 1/2 daily	\$550	5	\$37.50	centrifugal	electric & gas	190,000 daily	4.8 cts o	.....	.....	13,500,000	663
Donora	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Easton	.....	.....	.....	843	.....	.....	.....	.....	.....	.....	.....	.....
Farrell	1,500	104	1,500	1,000	.....	.....	.....	.....	.....	river	.....	.....
Harrisburg	.....	.....	.....	2,500	.....	.....	.....	.....	.....	.....	.....	.....
Hazleton	.....	.....	.....	1,350	.....	.....	.....	.....	.....	.....	.....	.....
Monongahela	.....	.....	.....	45	.....	.....	.....	.....	.....	.....	.....	.....
Norristown	.....	.....	.....	750j	.....	.....	.....	.....	.....	river	1,500,000 daily	.....
Norristown	2c	.....	2c	.....	.....	.....	.....	.....	.....	river	.....	.....
Ridgway	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sayre	3	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
So. Bethlehem	3	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Titusville	6	.....	200	295	.....	.....	.....	.....	.....	.....	.....	.....
Rhode Island												
Pawtucket	.....	2,251	626	4,064	centrifugal	steam	7,701,000	25.585	chem. precip. filtration	river bay	8,248,000,000	\$44,044
Providence	.....	.....	9,227	.....	.....	.....	.....	.....	.....	.....	.....	.....
Woonsocket	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Carolina												
Charleston	2 daily	.....	.....	.....	centrifugal	electricity	.....	.....	septic tank & drainage canal	river	.....	.....
Sumter	.....	.....	.....	700j	.....	.....	.....	.....	.....	.....	.....	.....
South Dakota												
Lead	10	100	1c	280	.....	.....	.....	.....	.....	.....	.....	.....
Mitchell	10	102	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sioux Falls	1	.....	10	.....	.....	.....	.....	.....	.....	.....	.....	.....
Watertown	1 1/2 daily	2,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee												
Columbia	.....	.....	1	6	.....	.....	.....	.....	.....	river	.....	.....
Texas												
Corsicana	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dallas	.....	.....	.....	.....	centrifugal	electricity	.....	.....	.....	.....	650,000 daily	.....
Port Arthur	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wichita Falls	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Utah												
Salt Lake City	.....	3,430	.....	.....	centrifugal	electric & gas	3,800,000 daily	9.390	.....	lake	.....	.....
Vermont												
Bellows Falls	.....	.....	3	196	.....	.....	.....	.....	.....	.....	.....	.....
Washington												
Aberdeen	.....	.....	2,640	528	.....	.....	.....	.....	.....	harbor	.....	.....
Spokane	.....	9,453	.....	3,018	.....	.....	.....	.....	.....	.....	.....	.....
Walla Walla	8 daily	.....	100c	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wisconsin												
Antigo	4	400	4c	.....	.....	.....	.....	.....	.....	.....	600,000 daily	.....
Appleton	.....	.....	4	150	.....	.....	.....	.....	.....	.....	.....	.....
Chippewa Falls	6j	.....	g	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eau Claire	.....	384	3c	892	.....	.....	.....	.....	.....	.....	.....	.....
Grand Rapids	4	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....
La Crosse	.....	.....	2c	.....	.....	.....	.....	.....	.....	.....	.....	.....
Madison	.....	.....	.....	.....	.....	electricity	.....	.....	.....	.....	.....	.....
Menasha	.....	.....	2c	.....	.....	.....	.....	.....	.....	.....	.....	.....
Neenah	.....	.....	2c	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portage	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Superior	1	800	2c	750	.....	steam	.....	.....	.....	.....	.....	.....
Waukesha	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
West Allis	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wyoming												
Cheyenne	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sheridan	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Canada												
Edmonton, Alta.	3	.....	p	.....	pumps	electricity	.....	.....	.....	.....	500,000 daily	2,000
Lethbridge, Alta.	6	.....	52c	.....	.....	.....	.....	.....	.....	.....	.....	.....
London, Ont.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	494
Stratford, Ont.	.....	.....	.....	.....	centrifugal	electricity	1,200,000 daily	.....	.....	.....	.....	.....
Toronto, Ont.	1	.....	.....	11,872	centrifugal	electricity	.....	.....	.....	.....	1,200,000 daily	.....
Windsor, Ont.	.....	.....	4c	100	.....	.....	.....	.....	.....	.....	.....	.....

a—Cost of 1,518,000 cubic feet of water. b—No record. c—Probably average each basin is cleaned. d—Probably all basins cleaned. e—3 1/2 million feet flushed and 340,000 feet scraped. f—Flushing, \$28,515; scraping, \$41,382. g—After every heavy rain. h—Part of sewage only. i—Including stoppages. j—Approximately. k—Part of system only. l—Per mile of sewer. m—Also 34,762 inlets washed. n—Includes flushing sewers. o—Per thousand gallons. p—Twice a week on paved streets.

(Continued from page 487.)

towed to the manhole, where the buckets are raised by men on the surface. Four men and a team remove about 10 cubic yards of material a day, most of this being fine sand. For this information we are indebted to A. P. Melton, the city engineer.

City Engineer C. C. Widener, of Bozeman, Mont., reports that no regular catch basins are used in that city, but the storm water is run directly from the inlets at street corners to a manhole in the center of the street which is very deep and acts as a catch basin for all the inlets.

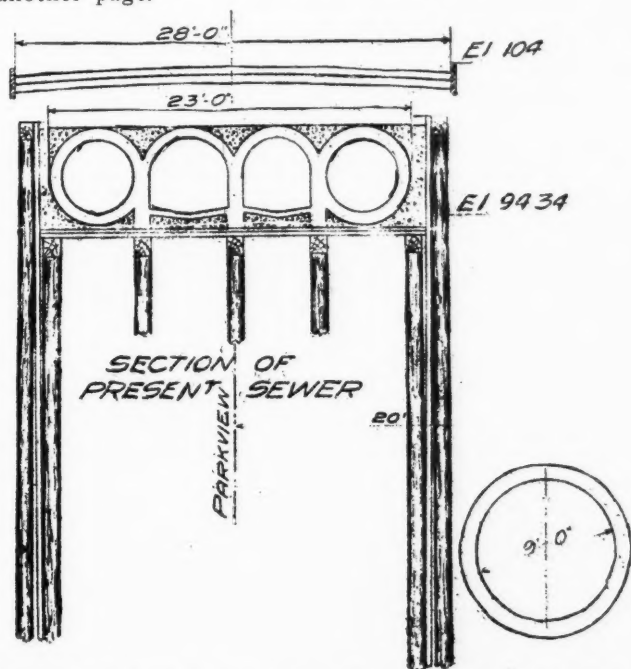
PURIFICATION PLANTS.

Purification plants are reported by 90 cities. Thirty-nine report the use of septic tanks only; 4 report the use of "tanks" (it is not stated whether septic or not) in combination with further treatment. Four report settling tanks alone, and in Washington, D. C., a settling basin is used at the pumping station in combination with screens and a "skimming tank" for the removal of grease. Three report the use of Imhoff tanks. Filter beds are reported by 17, sprinkling filters by 3, contact beds by 5 and slag filters by 1; while filters of one kind or another in combination with other apparatus are reported in five cases. The use of sewage for irrigation purposes, either crude or after passing through a settling or septic tank, is reported in seven instances. Chemical precipitation is still used in seven plants.

The combinations above referred to are as follows: "Tanks, filter beds, sprinkling filters and settling basins." "Tanks and filters; chemical precipitation, coarse filter and lagoons." "Tanks and contact beds." "Tank, contact filters and sand filters"; "tanks and contact filters." One city reports the use of hypochlorite only.

SEWAGE PUMPING PLANTS.

The reports concerning the pumping of sewage show that steam is used in 14 cases, electricity in 30 cases, gas engines in 5 cases and pneumatic ejectors in 2 cases, in one of which it is not now in use. The greater part of the steam plants are undoubtedly those for the pumping of large quantities of sewage. Most of the modern plants for lifting comparatively small quantities are motor driven, the plants in many cases operating automatically and require attention for only a few minutes each day. Descriptions of some of these plants will be found on another page.



SECTION OF OLD FAIRVIEW SEWER. NEW SEWER.

FAIRVIEW SEWER AND PUMPING STATION.

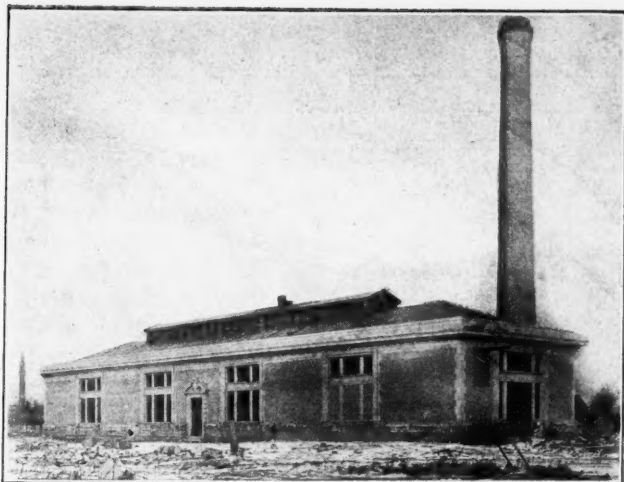
Deep Excavating in Made Ground—Tunneling in Clay—Methods and Appliances Used—Pumping Station and Outlet.

By A. L. SEARS, Assistant Sewerage Engineer, Department of Public Works, Detroit, Mich.

In October, 1912, a sewer and pumping station which drains that part of the city of Detroit, Mich., called Fairview went into commission. A large part of this section of the city was originally marsh and lies slightly below the normal level of the Detroit River. The section is made very desirable for residence purposes, however, by the fact that it is bounded on the south by Lake St. Clair. There already existed a sewer and pumping station, the former of 12-inch to 36-inch vitrified pipe designed to drain the pavement of Jefferson avenue only. Before Fairview was annexed to the city several large lateral sewers had been connected into this, but its capacity was so limited that the section suffered from floods in the spring, and it therefore became necessary to provide a larger sewer and adequate pumping station, which are described below.

The sewer is designed to extend from a pumping station on the river bank to and along Jefferson avenue for a distance of about five miles. The first section, 1,700 feet long, is of three-ring brick work, with an inside diameter of 9 feet, and was built, the lower 700 feet in open trench and the upper 1,000 feet in tunnel. In the trench work 22-foot steel sheet piling was used, which was braced by two rows of 12x12-inch wales with cross braces spaced about 10 feet apart. A clam shell bucket was used for most of the excavation, the final lines, which were in a soft putty clay, being cut out with knives. As part of this sewer ran through made ground for a large part of the depth, much water was encountered coming from a canal which paralleled the sewer 120 feet to the east, the surface of the water in which was about 27 feet above the sewer. It required much pumping to keep the trench clear of this water. Except for the southern end of Section I, however, very little water was encountered. This sewer was adjacent to and about 25 feet deeper than the old sewer.

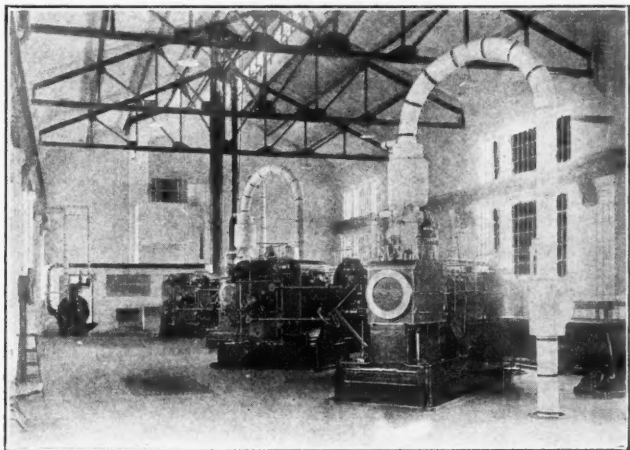
In carrying on this work, the old fill of ashes, dirt, etc., was first excavated, in a section about 16 feet long, down to the level of the clay, 6 or 8 feet above the bottom of the trench, and on top of which considerable water was found to be flowing down the line of the trench. In order to handle this water, a clay dam was placed at the down stream edge of the clay bench to keep it from flowing into the finished trench below, where construction was under way; the water collecting behind this dam being led into the upper end of the sewer already completed and flowing down this to a manhole at the southern end of the work, where an electrically-driven rotary pump was located which discharged the water on to the surface of the street. Immediately below this manhole was a brick bulkhead which kept the water from flowing further down the sewer. To carry the water from behind the clay dam into the completed sewer a 6-inch gas pipe was carried through the bottom of the clay dam, across the space where the clay was being bottomed out and given its final shape, and into the open mouth of the sewer, near the upper end of which was another clay dam which prevented the water from flowing back into the trench. The gas pipe, dam in the sewer and dam on the clay bench were all moved forward as the work progressed. The small amount of seepage water which flowed into the trench between the clay bench and the completed sewer was easily handled by



DETROIT SEWAGE PUMPING STATION.

the level of the ground and about 35.5 feet below mean water in the river.

The basement and walls of the pumping station rest on a blue clay foundation which was found to settle very little with the weight imposed on it. The basement does not extend under the boiler room, the walls of which rest on piles driven at approximately 2-foot centres. The pump pit extends parallel with the water gallery, its floor being 10 feet above the floor of the gallery. The pumps are set into the floor, with their suctions drawing water through sluices connected with the bottom of the water gallery. The engines are on the ground floor about 30 feet 9 inches above the bottom of the pump pit.



INTERIOR VIEW OF PUMPING STATION.

The two large pumps are driven by angle cross-compound, vertical-shaft condensing engines having a rated capacity of 542 horse power. A bronze and cast iron thrust bearing, carrying the weight of the shaft, transmits the total vertical load to the foundation pedestals through built-up structural steel trusses. The small 24-inch pump is used for the ordinary dry weather flow, and



OUTLET PIPES AT JUNCTION WITH MASONRY.

is operated by a 150 horse power motor, electricity for which is supplied by the Public Lighting Commission. A 10-ton hand crane spans the engine room 15 feet above the floor, traveling on tracks supported on the side walls.

Two 300 horse power Stirling water tube boilers, equipped with Detroit stokers, furnish steam at 140 pounds per square inch. Coal storage bins of 200 tons capacity are located in front of the boilers. A $\frac{1}{4}$ -ton electrically operated bucket runs the length of the bins, supported by an 8-inch I beam, the bucket being loaded outside the building and dumped wherever desired inside.

The superstructure of the pumping station is constructed with a steel frame, is equipped with steel doors and Fenestra steel sash, and has very little wood in it. Smith, Hinchman & Grylls were the architects for the station and consulting engineers for the design and installation of the machinery. Neal Finkell acted as their resident engineer. The Hunkin Conkey Construction Company of Chicago were the contractors for the building and the Camden Iron Works were the contractors for the machinery.

On the line of the sewer and 50 feet from the pumping station is a screen well or chamber which is circular with an inside radius of 9 feet, except at the ends of the screen, where the $2\frac{1}{2}$ -foot concrete walls are flattened, shortening the width to 15 feet. There are two sets of screens placed three feet apart. The guides for these are made of Z bars built in the wall, the central guide being made of two channels back to back supported on top by struts built into the wall. The screens are $7\frac{1}{2}$ feet high, and each is provided with a pan at the bottom to keep any of the material on them from dropping back into the sewer when they are raised to be cleaned.

The pumps discharge into four cast iron outlet pipes, three of which are 5 feet in diameter and one (for the small pump) 3 feet. These end at the inner bank in brick conduits of the same diameter encased in a single mass of concrete 24 ft. 4 in. wide; all of which extends for a length of about 170 feet into the river, and is supported on piles from 18 to 22 feet long. The inverts at the outlet are about one foot below mean water.

The cost of the sewer was \$298,000, that of the building \$144,000. The site for the station cost \$20,000 and the machinery \$118,000. The itemized prices were as follows:

- (A) Cost of inlet and outlet, \$19,200.00.
- (B) Sec. 1: Total length, 1,761 ft., 9 ft. cyl., 3 ring brick work. Average cut, 31.70. Southern section, built in open trench, length, 727 ft.; cost per ln. ft., \$44.566; 3 m. h. at \$100.00. Northern section built in tunnel, length, 1,034 ft., 9 ft. cyl., 3 ring brick work; cost per ln. ft., \$15.03; 3 m. h. at \$144.00.
- (C) Sec. 2: Total length, 3,700 ft., 9 ft. cyl., 3 ring brick work. Average cut, 30.60. Built in tunnel, cost per ln. ft., \$12.45; 8 m. h. at \$75.00.
- (D) Sec. 3: Total length, 3,466 ft., 9 ft. cyl., 3 ring brick work. Average cut, 25.30; built in tunnel; cost per ln. ft., \$15.83; 8 m. h. at \$90.00.
- (E) Sec. 4: Total length, 443 ft. Average cut, 21.50; built in tunnel and open trench. Length of 9 ft. cyl., 3 ring brick work, 1,932 ft.; length of $8\frac{1}{2}$ ft. cyl., 3 ring brick work, 2,626 ft.; length of 8 ft. cyl., 3 ring brick work, 1,885 ft. Cost per ln. ft., \$14.60; 15 m. h. at \$100.00. The western 2,680 ft. was built in tunnel and the remainder in open trench.

These were contract prices, and do not include the cost of cement, which was furnished by the city. The cost of inspection and cement was \$32,307, making the total cost of the work \$298,000.

W. F. Day and A. L. Sears, assistant engineers, were in charge of the sewer work. The designs and specifications were prepared in the city engineer's office by R. H. McCormick, city engineer.

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APRIL 3, 1913.

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Co-Operative Board of Health Service.

A new plan is being developed in Massachusetts for securing, through co-operation, expert board of health services for smaller cities and towns which could not individually afford to employ experts for this work. The originator of the idea is Professor E. B. Phelps, of the Department of Public Health and Biology of the Massachusetts Institute of Technology, with whom are associated in this work Professor Sedgwick and Professor Gunn, both of the same department. Professor Phelps does not claim anything wonderfully novel in the scheme, but in a recent letter says: "Perhaps the real point of merit is our method of getting it adopted. It is practically impossible to get towns to agree upon any such sort of thing because of petty jealousies and even of more serious legal hindrances. It seems that the services of a third party having both reputation and financial backing were necessary to launch this work. It would then be necessary for the towns to contract with that party for what they desire." As the Department of Public Health of the Institute of Technology possessed the necessary requirements, it offered its services in support of the project. It is hoped ultimately to make the service independent, and it is already self-supporting. Incidentally,

it provides a market for the graduates of the institute who have been studying to serve as health officers. The system is now operating satisfactorily in Wellesley and has started in Belmont. It is being considered by Framingham and Weston, while Melrose is considering the adoption of the milk inspection part of the program.

The staff includes Robert N. Hoyt as health officer and Miss Edith A. Beckler, assistant professor in bacteriology at Simmons College, who is in charge of the laboratory. The staff, as soon as in working condition, will consist of an official representative of the health organization of the town, a chemist and bacteriologist with an assistant, a plumbing inspector and two sanitary inspectors. Professor Phelps says that with this staff he can care for the health of 35,000 people scattered through several municipalities. The service is offered to any town within 25 miles of Boston, the cost to be sufficient only to cover the actual expenses. Among the things which the service is doing is the analyzing each month of all the milk supplies sold in the town and making inspection of the dairies from which they are sent out; examining cultures in all cases of infectious diseases and making prompt report on them; also in all cases of infected horses and cattle or other animals. Also, it is proposed to conduct a campaign of extermination against mosquitoes, expending under expert supervision whatever funds the town wishes to appropriate for this purpose. In connection with the milk examination, it is not proposed to prosecute milkmen who sell milk of a grade below the legal standard, but to publish the result of the analyses each month, so that the public may know just what kind of milk it can expect to receive from each dealer.

Officials connected with state boards of health and others who have interested themselves in the matter appreciate how lax, and in many cases how ignorant of the principles of sanitation, are many of the boards of health in small places, and some such plan as this would, it seems to us, be of advantage in all parts of the country; and it would seem desirable for the states themselves to make permissible, if not compulsory, some such co-operative service. Something of the kind has been recommended to Governor Sulzer of New York state by a special health commission appointed by him, and has been embodied in a bill which he has sent to the Legislature. We believe, however, that this bill even goes further and abolishes altogether the town and village boards of health and substitutes for them a state system of direct sanitary supervision by experts.

Sewer Maintenance in St. Louis.

St. Louis, Mo., has in use about 720.6 miles of sewers, on which are 20,008 inlets. There are no automatic flush tanks, but the sewers are washed by use of 2½-inch fire hose. During the fiscal year of 1911-1912 sewers were washed 547 times and inlets 34,762 times. Catch basins and inlets were cleaned 24,043 times. The cost of all cleaning, including removal of debris to dumps, etc., filling condemned inlets and removing snow from in front of inlets, was \$73,156.74.

About 150,000 gallons per hour of the sewage is pumped, two 25 horse power centrifugal pumps, operated by electricity, being used for this purpose. The cost of this, including current, oil, etc., and day and night watchmen, was \$4,500 for the year.

Repairing and reconstructing brick and pipe sewers, manholes, inlets and catch basins cost \$32,240. The superintendents and clerk were paid \$7,500. Miscellaneous expenses, such as flushing ditches, watchmen, labor at snow dumps, investigating complaints, etc., cost \$15,621.73; making the total maintenance cost for the year \$133,018.54.

NEWS OF THE MUNICIPALITIES

Current Subjects of General Interest Under Consideration by City Councils and Department Heads—Streets
Water Works, Lighting and Sanitary Matters—Fire and Police Items—Government and Finance.

ROADS AND PAVEMENTS

Council Decides on Street Material.

Seaford, Del.—Seaford officials have decided to use crushed stone instead of oyster shells to improve the streets.

Paving Starts at Abilene.

Abilene, Tex.—The contract for the construction of all paved streets to the connecting county roads, has been let and work will start at once. Over \$30,000 will be expended in road improvements.

Plan Turnpike from Manchester to London.

Barbourville, Ky.—Citizens of Laurel and Clay counties have in process of organization a stock company which will build a toll turnpike from London to Manchester, a distance of 24 miles. Twenty-two thousand dollars have been subscribed by Clay county citizens, and it is expected to get an equal amount in Laurel county. Clay county has no railroads, and no connection with other counties except over the roughest mountain highways. At one time the Fiscal Courts of Clay and Knox counties voted to build a turnpike from Barbourville to Manchester, but the project was abandoned.

Paved 15 Miles of Streets.

Anniston, Ala.—Dr. J. L. Wikle, Mayor of Anniston, stated that during his term of office he has built 15 miles of macadamized roads in the city limits, and the work is still going forward. Improvement of the streets of the city has been made one of the features of the two administrations of Dr. Wikle. He has also built a number of concrete bridges. Dr. Wikle says that as soon as the weather gets a little warmer he is going to declare an official clean-up day, and that the new sanitary law, recently enacted by the city council, will be enforced.

Township Road Bill Out.

Harrisburg, Pa.—The Township Road bill has been reported to the House by the Public Roads Committee. This is the bill which creates the State Bureau of Township Highways, and provides for election of county road superintendents by supervisors' conventions. State aid to the extent of 50 per cent. of cost of work on roads, not to exceed \$20 per mile, is provided.

Estimates for \$1,000,000 County Road System.

Fort Worth, Tex.—Consulting Engineer J. C. Travilla, who will supervise the construction of the new county roads for which a \$1,000,000 bond issue was made last spring, filed his official estimates of the cost of the entire system with the County Commissioners. The average cost per mile will be \$6,297, and the total cost will aggregate \$830,520. The plans and estimates embody two classes of roadway: one to be constructed of asphalt macadam, and the other of waterbound macadam, which has an asphaltic oil surface treatment. The total mileage of the eight cardinal roads is 131.38, the length of the various roads being as follows: Grapevine, 24.28 miles; Dallas, 15.19 miles; Mansfield, 22.50 miles; Burleson, 11.20 miles; Cleburne, 13.22 miles; Weatherford, 13.38 miles; Azle, 13.44 miles; Keller, 18.64 miles.

County Roads Being Repaired.

New Berne, N. C.—The Craven County convicts are now working on the road between Saint's Delight Chapel and Vanceboro. The convicts will in the future have their camp near the point at which the work they are engaged

in at that time is in progress. A large steel cage, which can be transported to any point, has been purchased by the county, and at night the men are locked in this. Tents have also been secured, and these are occupied by the guards. In addition to being very convenient, this new mode of housing the convicts is absolutely sanitary. The work on the road now receiving attention will be carried on to the point where the proposed Farm Life School is to be erected, and, according to a statement made by R. E. Snowden, the expert road engineer recently employed by Craven County to superintend its road building, it will be one of the best constructed dirt roads in the county. After the road has been put in good condition it will of course be necessary to keep it in repair. With this object in view, the county is appointing road foremen in each township, and it will be the duty of these men to see that the road is at all times kept in good condition. At present there are only twenty-two men on the convict force and the work cannot progress very speedily with such a small force.

Report on Improvements.

Indianapolis, Ind.—The city engineering department has prepared for the board of public works a comparative statement showing the street and sewer improvements completed during the years 1910, 1911 and 1912. In 1910 such improvements cost \$550,347.87; in 1911, \$626,598.09, and in 1912, \$977,626.44. In 1912 among the principal terms were asphalt pavements, costing \$334,123.60, and bituminous concrete pavements amounting to \$107,310.91. During the year main sewers completed cost \$249,317.39 and local sewers cost \$81,428.36. Improvements completed during the year, including streets and sewers, aggregated 72.63 miles.

Will Relay Broadway Paving.

Long Branch, N. J.—The work of ripping up the old asphalt pavement will be continued down Broadway as far as Second avenue. Operations will then be transferred to Third avenue, as this avenue is considered almost as important as the main thoroughfare. At present the force of men doing the work is limited as there is no necessity of removing too much of the surface until the bituminous plant is in operation. The paving company, under its contract, must pay the cost of removing the old asphalt and cart it to a point within a half mile distance or at a designated place set aside by the city. Alfred A. Rose, who is superintending the work for the paving company, is having the plant thoroughly overhauled with a view of starting operations early in the week. Mr. Rose says they can construct between 1,000 and 1,200 yards of pavement each day, weather permitting.

City Engineer Reports.

Little Falls, N. Y.—City Engineer Dempster has filed with City Clerk Leahy the annual report of the board of public works for the year 1912, and a review by himself of the conditions of the streets, parks, etc. The financial condition of the different funds all show a balance except the highway fund, which shows a deficit of \$4,091.13. After covering and outlining very thoroughly the work he has accomplished during the past year, Mr. Dempster makes the following recommendations: The improvement of German street, to be used for a market road; that Southern avenue, Hansen avenue and Lock street be paved, as the leading approaches to the barge canal terminal; that the lines of Elizabeth street as recommended in 1908 be established, and that the street be paved so that the mill district will have good facilities when the new freight house is completed; that Mary and William streets be paved be-

tween Main and John streets, and that permission be asked of the state to use the small triangles on Mohawk street and at the corner of West Jefferson and German streets as parks; and that playgrounds be provided off Loomis street and German street, in order to keep the children away from the traffic zone.

Racine Has Twenty-Nine Miles of Paved Streets.

Racine, Wis.—More than twenty-nine miles of Racine streets are paved at the present time with the different kinds of pavement, brick predominating. There is a complete link of pavement extending around the city, giving the automobilist excellent opportunities for pleasure rides. Each year sees a large increase in the streets paved, over \$46,000 being expended by the city last year for this feature alone. The pavement now in the city, and the different kinds, are: concrete, .08 miles; asphaltic concrete, .13 miles; macadam, 2.64 miles; asphalt, 6.8 miles; brick, 20.28 miles; total, 29.21 miles.

City Plans Trial of Creosoted Blocks.

Tacoma, Wash.—To give a Tacoma industry an opportunity to compete with the so-called asphalt trust, Commissioner of Public Works Owen Woods is considering putting down several experimental patches of creosoted wood block paving. The creosoted blocks are manufactured by the St. Paul & Tacoma Lumber Company. Two-inch blocks will cost the city about the same as asphalt paving, and it is said they will last longer. To determine just what the comparative wearing qualities of the two materials are, City Engineer Raleigh said that the city probably would lay a few feet of asphalt and a few feet of wood blocks in one block. Four-inch wood blocks have the same relative cost as brick pavement. They have the advantage of being noiseless, the city engineer said, and are supposed to last just as long.

Drags for Country Roads.

Erie, Pa.—Soon thirty of the latest style King road drags will be put into service on as many sections of the public highways in the county. The drags have been finished and delivered to the good roads committee of the Erie Motor club and will be distributed to the thirty pathmasters, who will use them during the spring and summer. Each of the drags is planned to take care of eight miles of road, so it is expected that at least 240 miles will be kept in good condition for automobile and farming travel. The roads along the lake shore, east and west of the city between the New York and Ohio lines, will be supplied for the entire distance. Southwest of the city, the roads to Edinboro and Cambridge Springs and to Meadville and Conneaut Lake will be equipped. Southeast, the highways leading to Waterford and Union City and more easterly the roads to Wattsburg, Corry and Findley's Lake will be kept improved. The use of the drags is expected to bring the farmers to observe their operation so that next year every road in the county can be equipped. With the drags will be supplied instructions as to their operation in keeping the road up to the highest standards.

Paving Work Halted.

Terre Haute, Ind.—The County Commissioners have halted proceedings for \$150,000 worth of brick paving of roads from the city limits to the outer boundary of the township because of doubt as to the interpretation of the new law which Terre Haute good roads advocates caused to be enacted especially for the purpose of permitting paving these roads. Two questions arose, one as to the payment by the traction company for the part of the road occupied by tracks and the other, the manner of payment where the city limits are in the middle of a road. In three of the roads the interurban lines have tracks, a double track being in one of them. The commissioners have asked for legal advice. They say that if the company will not pay its share as it does for paving streets in the city, the tracks can be taken up or moved to one side of the road.

As to the roads of which the city line is in the middle, the commissioners are in doubt whether the county is to pay for the full width of the paving or to have an agreement by which the township will pay half. The Commercial Club, Young Business Men's Club, and other civic organizations are asking the commissioners to appoint a consulting engineer to assist the county surveyor in supervising the work of paving.

Good Progress Made on Highway.

Bristol, Va.—Good progress is being made on the construction of a stone highway between Bristol and Abingdon, a distance of fifteen miles. A force of convicts has been at work on this road since last summer, and already a few miles have been graded. It will be one of the most picturesque and interesting roads in Virginia, as it courses a beautiful farming section. The Bristol-to-Washington Highway Association was largely instrumental in getting this work started. This association has interested every county between Bristol and Roanoke, and it now looks as if that section of the proposed road to Washington between Bristol and Roanoke will be constructed within the next year or so. It is the purpose of the association, after this work is well under way, to proceed to agitate the building of other links east of Roanoke in the direction of Washington. The importance of this road is emphasized all the more when it is known that the Tennesseans are building on a connecting road, which is to be constructed through every county between Memphis and Bristol. Some counties have already completed their sections of this road, while others are voting bonds and otherwise arranging for the work.

SEWERAGE AND SANITATION

Appraise Temple Sewer Plant.

Temple, Tex.—Engineers employed by the City Council to estimate the value of the plant of the Temple Sanitary Sewer Company, for whose purchase negotiations are being carried on, have advised that they estimate the same to be worth \$46,000 on a physical basis and that depreciation brought the actual value of the same to figures of approximately \$40,000, not including good will and the advantage of being a going concern. The sewer company purposed to sell to the city for \$45,000 about a year ago. The engineers estimate that to build a new plant capable of supplying the wants of the city for fifteen years it would require the expenditure of \$140,000.

City Agrees to Pay Imhoff Royalty.

Pasadena, Cal.—"Pay or do without," is the ultimatum sent the city by the holders of the Imhoff patents upon sewage tanks, and as the city will have to install Imhoff tanks to make the city farm less objectionable, or ultimately be deprived of the privilege of disposing of sewage there, it is pretty hard to know what else to do save comply with the demand. The city is offered the full right to use the Imhoff patents as extensively as it desires for \$1,700, and the question is whether to build the first tank in advance of knowing absolutely whether or not it will solve the problem, or to allow the matter to drop where it is. It was finally decided that the necessity of doing something is so great that the city will have to pay the patent royalty, and it was so ordered.

Start Work on Sewer Interceptor.

Washington, D. C.—Work on the Zoological Park section of the big Rock Creek main sewer interceptor will begin about April 1, according to announcement made by Asa E. Phillips, Superintendent of Sewers of the District of Columbia. Contract for the improvement has been awarded the Warren S. Brenizer Construction Company of Washington. The cost, it is stated, will be approximately \$40,000. The building of this section of the interceptor will require probably all of a year. A tunnel more than 2,000 feet long will be constructed through the Zoo Park hill. It will start at the south end, near Adams Mill road bridge, and be carried to a point on the opposite side

of the hill, near Kingle road. Practically solid rock is expected to be encountered, so that a great deal of blasting will be required. The tunnel, at its greatest depth, will be about 100 feet below the surface of the ground. It will extend about 400 feet west of the Zoo buildings. Construction of the Zoo Park section of the Rock Creek interceptor is part of a general plan to prevent this stream from becoming polluted with sewage. The next section to be built will care for sewage in Rock Creek. Other sections will be added until the sewerage system has been carried to the District line. It will require about five years to complete the improvement.

City Fly Campaign.

Pensacola, Fla.—If a suggestion made by Mayor Reilly to the Board of Health at its meeting is put into effect, the chances are that there will be a greater number of flies killed in Pensacola this summer than at any time previous. The Mayor suggested that for every thirty flies killed by a child under fifteen years the board furnish the child with a free ticket to any of the moving picture shows in the city. If the board finds that there is sufficient money in the general fund to conduct this campaign, an appropriation will be asked for, and, if allowed, the slaughter of the flies is to commence. The managers of the different moving picture shows will be consulted for the purpose of finding out to what extent they will interest themselves in the swat-the-fly campaign.

Sanitary Survey of City Begins.

Galveston, Tex.—The sanitary survey of the city has begun under the direction of Dr. Jas. P. Simonds, professor of preventive medicine at the State Medical College. This matter has been before the Woman's Health Protective Association, the Galveston Commercial Association and the City Commission for some time, and the consummation of their plans is the commencement of the work which is well under way. Accompanied by six health officers of the six sub-divisions of the city, Dr. Simonds is now engaged in an inspection of the city district by district. The party is equipped with cameras and all necessities for making pictures of the unsanitary places found. These, together with a survey of the city, will be submitted to the Galveston Commercial Association, which is defraying the expense, at the close of the campaign. The purpose of the sanitary survey under the direction of Dr. Simonds is to furnish exact data which the different organizations of the city may use in making Galveston the cleanest city in the world.

Drain Will Eliminate Mosquito Pest.

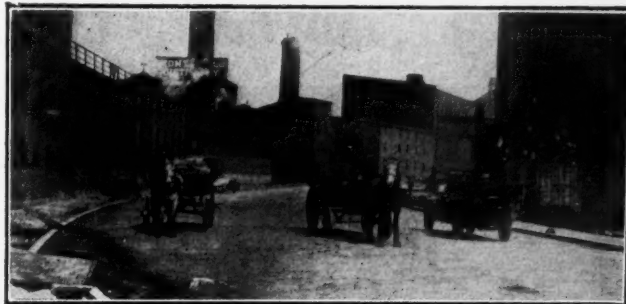
Providence, R. I.—Work on the sewer in Blackstone Boulevard, Swan creek section, is progressing favorably with the aid of a big trenching machine. With the completion of the work residents of the Second Ward hope that the drainage of the low-lying sections will be so much improved as to eliminate the much complained of mosquito pest.



Courtesy Providence Journal.
CONSTRUCTING DRAIN IN BLACKSTONE BOULEVARD.

Street Now Built Over Formerly Offensive Stream.

Baltimore, Md.—A section of the Fallsway has now been finished and opened to traffic as shown in the illustration. Jones Falls was a stream leading through the business section of Baltimore. Storm water and some sanitary sewers used to discharge into the stream and the conditions were far from desirable. Besides at times the storm



Courtesy Balt.more News.

STREET OVER RIVER BED.

water flowed back through the sewers and caused considerable damage at times. The Sewage Commissioner, Calvin W. Hendricks, chief engineer, has lead the storm water drains into other channels and has bridged over and paved the surface making a much-needed street.

Paper Drinking Cups for Parks.

Washington, D. C.—Gen. Oliver, Assistant Secretary of War, has approved conditionally a proposition made by Col. Spencer Cosby, the engineer-officer in charge of public buildings and grounds, for the installation in the public parks of Washington of machines containing individual paper drinking cups. In support of his proposition, Col. Cosby said that it had been intended to do away with the dippers now attached to the drinking fountains in various parks and substitute sanitary bubble fountains, but that objection had been made to that plan. After general consideration of the subject it was concluded that the installation of cup-vending machines alongside each fountain in the parks would be to the interest of the public health. Gen. Bixby, chief of engineers, forwarded Col. Cosby's report to the Secretary of War, with the recommendation that drinking-cup machines be put in the parks with the distinct understanding, however, that there be no monopoly. The papers in the case have been returned to Col. Cosby, by direction of Assistant Secretary Oliver, approving the project and suggesting that the privilege be granted only after public competition.

\$44,000,000 Is Sewage Estimate.

Harrisburg, Pa.—Dr. Samuel G. Dixon, state commissioner of health, has figured that it will cost \$44,000,000 to build the municipal sewage disposal plants outside of Pittsburgh and Philadelphia. There is a proposition to have the state pay half of this cost, the plan being to commit the Commonwealth to an expenditure of \$22,000,000, divided into 11 biennial payments. S. Taylor North, chairman of the house appropriations committee, has put out a bill carrying \$1,000,000 as a starter for the big enterprise. It necessarily follows that if the state is to help other municipalities the claims of Pittsburgh and Philadelphia would have to be considered. The estimates for these two cities have not been completed. Some legislators think that the money should be raised by bond issues instead of being taken out of the ordinary revenues. This likely will be debated when the North bill is reached on second reading in the house this week. The appropriations committee took up the subject with Dr. Dixon, and learned just what it would cost to take care of every municipality outside of the two great cities, which are not yet able to approximate the expense. As many of the places already are burdened with debt and disposal plants are held necessary for the public welfare the gravity of the situation is apparent. The figures show that the places which have been ordered to construct plants face an expenditure of \$20,085,000, and

those which have not been ordered to erect plants some day \$24,050,000. The municipalities ordered to erect plants are as follows: Twenty-one cities, exclusive of Philadelphia and Pittsburgh, cost, \$4,025,000; 29 boroughs of over 10,000 population, \$3,480,000; 52 boroughs between 5,000 and 10,000, \$4,160,000; 53 boroughs between 3,000 and 5,000, \$1,350,000; 63 boroughs between 1,000 and 2,000, \$2,520,000; boroughs of less than 1,000, \$720,000, and eight first-class townships between 2,000 and 17,000 population, \$640,000, making a total of \$20,085,000 to be divided by two. The municipalities which not been ordered to construct are as follows: Four cities, Johnstown, Scranton, Monongahela and Pittston, \$850,000; seven large boroughs over 10,000 population, \$840,000; 24 boroughs having between 5,000 and 10,000, \$1,920,000; 26 boroughs between 3,000 and 5,000, \$1,560,000; 45 between 2,000 and 3,000, \$2,250,000; 106 between 1,000 and 2,000, \$4,240,000, and 413 having less than 1,000, \$12,390,000, making a total of \$24,050,000, to be divided by two.

Would Purify Sewage.

Sacramento, Cal.—If the recommendation to be made by City Engineer Givan is heeded by the City Commission, the installation of a sewerage system in the annexed territory, for which a bond election is to be held April 12, will cost approximately \$1,033,000. Givan recommends that a purification plant be installed at an approximate cost of \$76,000. The purification plant consists of Imhoff tanks, the effluent of which will be treated by the hypochlorite process, which will make the resultant modified sewage non-putrescible and readily disposed of in the Sacramento River. The treatment that Givan proposes to give the sewage would avoid any conflict with the regulations of the State Board of Health covering the emptying of sewage into the Sacramento River and the pollution of the stream. A treating plant would save to the people of the annexed territory approximately \$1,074,000, the report says. When the annexed territory becomes so densely populated as the territory in the confines of the old city limits, there would be approximately 23,000 cesspools, costing on an average of \$50 each. The estimated cost of the cesspools to the property holders for such cesspools is \$1,150,000. Deducting the cost of the treating plant, the city engineer maintains the ultimate saving to the people would be \$1,074,000.

Board of Health to Clean Market.

Charleston, S. C.—The health department has announced that active and energetic measures have been already put into effect to clean the market thoroughly and that it is proposed to keep it clean, the department using all of its police powers to enforce its rules. As a means toward this end the department determined, following a recent decision in the police court, that the city scavenger carts shall not be used for the removal of decayed fruit and produce but that the dealers themselves must provide their own means for transportation of this stuff to the dump. Health Officer J. M. Green recently put Chief Inspector Torlay to the task of looking after the cleaning up of the market, and he said that Mr. Torlay had done good work. Mr. Torlay has made a personal canvass through the market and Market street, bringing the matter to the attention of the dealers and emphasizing the importance of not only keeping their premises clean but also not disfiguring the streets. The dealers have been apprised of the resolution of the health department and it is proposed to proceed vigorously against all offenders.

Not Satisfied With Disposal Plant.

Narragansett Pier, R. I.—Residents of Narragansett Pier are again discussing the never-ending sewerage question. This subject was supposed to have been settled about three years ago by the installation of a septic tank and new mains at a cost of about \$30,000, but it appears this has not properly settled the question. The subject was brought up at the town council session last week and some very pointed remarks were made by a former member of the council. He declared that it was the general belief of summer residents that now a septic tank was installed the sewage

passed through it was purified, but as a matter of fact he declared fully two-thirds of the sewage goes direct into the ocean just as it always has. He expressed the opinion that money spent last summer in operating the septic tank was largely waste, as mostly water was pumped into the septic tank. It was admitted by a member of the council familiar with such matters that water was pumped into the tank. That the present sewage system was a very complicated affair was the belief of a former councilman, and he emphasized the need of an expert examination to determine what was best to do, as all agreed that the sewerage question ought to be settled before the summer season opens. The council is to make an investigation and some action may be looked for soon.

WATER SUPPLY

New Wells for Bay City.

Bay City, Tex.—The city is making use of an extra artesian well to meet the increased demand upon the water supply. The water in this well is brought to the surface by a compressed air device whereas the old well is pumped direct. It is possible a third well will have to be sunk in the near future.

Petersburg Will Buy Water.

Petersburg, Va.—The Common Council authorized Mayor George Cameron to make contract for the city with the Virginia Railway & Power Company for the city water supply. The city is to pay \$9.50 per million gallons for the water furnished by the power company from the canal locks, three miles west of the city. The improvement of River street, filling it in to a grade of about 4½ feet above the present grade, and paving were also authorized. The report of City Engineer Budd estimated the cost of this work, exclusive of damages to be paid abutting property owners, at \$44,700.

Water Company Completes Work.

St. Joseph, Ind.—Five new filters have just been completed by the St. Joseph Water Company. These filters are located on the flat, near the pumping station, and from these the water is pumped to the reservoirs on the top of the water works hill, from where the water is distributed to the patrons in the city. The company has also installed a new pump, which has a capacity of 8,000,000 gallons in twenty-four hours. This makes the total pumping capacity of the company about 30,000,000 gallons a day. The consumption is about 7,500,000 gallons a day, so the company is protected against almost any emergency which might arise. During the coming season the water company is to tear down the present boiler room and erect a new building in its place.

Gallitzin in Danger of Water Famine.

Gallitzin, Pa.—The people of Gallitzin are beginning to feel uneasy concerning their water supply. Part of the town is now supplied by a system owned by the Cambria Water Company, a subsidiary of the Pennsylvania Coal & Coke Company, and part of it by the lines of the Manufacturers' Water Company, a subsidiary of the Pennsylvania Railroad Company. Both concerns decline to serve the people with additional water, and the latter will cut off the supply in August, as its contract is up at that time, and it claims to need all the water it has for its own use. A movement is on foot to erect a borough water plant, and a stream has been condemned near Bennington which is expected to furnish an adequate supply. Bonds will have to be issued to raise the money for the plant, however.

Meters Stop Big Waste.

Topeka, Kan.—In the annual report of the City Water Works Department is shown that in the last year the Topeka municipal plant has saved more than a quarter of a million gallons of water daily by the use of meters on the entire city service. By the abandonment of flat rate services this report by Superintendent Shaw and Commissioner Miller shows that the city has been able to curb

an alarming water waste and save hundreds of dollars in fuel consumption. The daily average pumpage from the water works plant for the year 1912 was 2,809,304 gallons, or 258,409 gallons less than the record for 1911. Despite the enlargement of the plant, the increase in the city's population and the gain in the number of water users, the average was reduced and the plant economized in fuel and in the expense of operation. According to this report it is shown also that the city water works pumped 62 gallons of water a day for every man, woman and child living in the city. January was the big month of 1911. More than 116,000,000 gallons of water were pumped in this month. September followed a close second with 93,000,000 and February with 91,000,000. The summer months called for less water in Topeka in 1912 than the winter months. In the twelve months 371 new taps were made, or more than one each day. At the same time 1,441 meters were set. Eight years ago under the old system the company had 3,838 taps in Topeka. To-day under the municipal ownership and the present management of Superintendent Shaw and Commissioner Miller, the city operates through 6,853 taps, or nearly double the number used eight years ago. One of the important improvements of the year has been the placing of valves in the fire hydrants on Kansas avenue. This makes it possible to repair a break in any fire hydrant without shutting off the entire uptown service.

STREET LIGHTING AND POWER

Start Work on New Plant.

Kendallville, Ind.—Work on the new municipal lighting plant has begun. The new building will be located just east of the present plant and will be 44x44 feet. It is expected to be in readiness for the installation of machinery about June 1. The total cost of the equipment and building complete will be \$46,000.

Install New Machinery.

Somerset, Ky.—The Kentucky Utilities Company, which purchased the public utilities of the city some time ago, including the water works, street railway, electric light plant and power house, is installing new and more powerful machinery at the power plant, in preparation for the increased power which will be necessary for the operation of the new filtration plant which is being installed, and also for furnishing power to the town of Burnside, seven miles from Somerset, located on Cumberland River, it being the head of navigation on that stream. Wires are being strung from the power plant to the pumping station, two miles east of Somerset, where the filtration plant is being installed, and electric power will be furnished there in a short time. Poles are also being erected from Somerset to Burnside for the wires from the power plant to that little city where power will also be furnished. The company has also ordered some new street cars for operation in Somerset.

Municipal Electric Light Plant a Success.

Brookings, S. D.—That a municipal electric light plant may be of value to the city which possesses it is well illustrated by the city of Brookings, which owns the plant. After an investigation by Alderman Roberts on account of the protest that the lights were too expensive, the City Council made a reduction of from 12½ cents to 10 cents with a minimum charge of 50 cents. The city is planning to engage in the supply business and will sell motors and other material at cost to induce a more liberal use of the current, which is supplied day and night.

FIRE AND POLICE

Breaking of Dam Leaves City Without Fire Protection.

Big Rapids, Mich.—Seven factories, including the plant of the Big Rapids Electric Power Company, are out of commission for an indefinite period as the result of the washing away of the upper dam on Friday, the 14th. The river reached the flood stage Thursday night, and a large force of men worked all night and Friday to save the

dam, but the top of the structure began breaking up. Shortly afterward the two east piers went out and now the dam is a complete wreck. The property loss will be between \$50,000 and \$75,000. The city is entirely without fire protection. The high water put the water works out of commission, and the auxiliary pump, which was put in for just such an emergency, had been removed for repairs and would not be in commission for several days.

Police and Firemen Given an Increase.

Cambridge, Mass.—Commissioner of Public Safety Cunningham notified the Cambridge police and firemen of his decision in regard to their raise in salary which was granted last spring by the Board of Aldermen. Commissioner Cunningham announces a 10-cent per day raise in salary to the members of both departments with the exception of the chiefs of both the Police and Fire Departments and the deputy chief of the latter.

\$66,890 Is Net Loss from Fire in 1912.

Tacoma, Wash.—The twenty-fourth annual report on the work of the Fire Department, filed by Chief George McAlevy with Commissioner A. U. Mills, shows the total fire loss for the year was \$428,313, of which \$361,423 was recovered in insurance. The net loss was \$66,890. The yearly cost of maintaining the department is given as \$229,174, of which \$135,720 was in the payroll. The value of the fire apparatus owned by the city is \$439,329.

Woman a Member of City Police Force.

Birmingham, Ala.—Miss Elizabeth Hutchinson has been appointed member of Birmingham police force and will give much attention to female offenders. She has been assistant to the police matron for some time.

Miles of Wires to Be Run Underground.

Providence, R. I.—The work of installing 31 new fire alarm boxes and putting nearly 165 miles of fire alarm telegraph wires underground in various sections of the city, for which \$30,000 has been appropriated, will be begun within three weeks under the direction of Electrical Engineer Brunet. Plans for the task, which will take between three and four months, involve the placing underground of 163 miles of single-conductor cable and 1½ miles of lateral duct, wrought iron piping, with telegraph cable inside of it, the erection of 26 cablehead posts, 31 of new firebox posts, and the construction of 8 manholes. The work is in line with the effort of the city to get as large a percentage of its fire and police wires underground as possible. Since the cables will, in most cases, be placed in the conduits of the Providence Telephone Company, it is planned to have a large share of the work done by that concern. All aerial fire alarm wires will be removed in large sections of Brook, Angell, Thayer, Eddy, Broad, Public, West Exchange, and Plainfield streets, and Prairie and Pocasset avenues. The sum of \$10,000 has been appropriated for similar work in connection with the placing underground of the police telegraph wires, and work upon plans for this change is now nearing completion.

Install New Fire Alarm System.

Pensacola, Fla.—Fitted with modern devices and arranged in such a manner that no time is lost in putting them in operation, Pensacola's first central fire alarm station has been placed in commission. The apparatus in the station was installed by City Electrician Len Le Baron. Alarms are received over a four-circuit system instead of a one-circuit as heretofore. All alarms pass through a four-circuit Gamewell repeater and are sent to the truck houses by an automatic transmitter, an electrical device operated by placing a cog wheel patterned to correspond to the wheel in any box which may be turned in for a fire. The transmitter will also be used in sending in "phantom" alarms to the truck houses, the only additional cost to the city being the price of the cog wheels. A four-circuit switchboard and a water gauge showing the pressure every minute and hour of the day and night are also part of the equipment. Maps showing the location of fire alarm boxes and all wires used in the system are within sight of the operators. The installation of a four-circuit system prevents the failure of an alarm sent to the truck houses.

MOTOR VEHICLES

Combination Chemical Auto Will Save Heavy Truck.

Billings, Mont.—Fire Chief Kennedy has received a letter from the American-La France Fire Apparatus Company at Elmira, N. Y., stating that the new automobile hose and chemical wagon recently purchased by the city from that concern is being rushed to completion and will be ready to ship by the time stated in the contract at least. The chief was asked to send the sizes and kind of connections desired for the 45-gallon chemical tank with which the automobile will be supplied. "When we have this new machine," said Chief Kennedy, "it will not be necessary to take the ladder truck to small fires, as we have had to in the past, because it carries the big chemical tank, and we have only 30-gallon portable tanks on the hose wagon. If it hadn't been for the big chemical tank on the ladder wagon the loss at the Perkins fire on North 30th street a short time ago would have been much larger than it was, as we held the fire in check with that until we could go back to the station and get more hose."

Police Ambulance in Commission.

Los Angeles, Cal.—The new ambulance, a gray Premier, with a red cross on its sides and the words "Receiving Hospital" in gold letters, and on the front the word "Police," has been placed in service. The crews consist of a driver and a policeman, but no physician, except in cases where several are injured. The policemen selected for the crews are experienced in first aid service, and Police Surgeon Zerfing regards them as trustworthy in this respect as young physicians. The ambulance is only for emergency work and for such cases as must be transported quickly for treatment. Patrolmen are cautioned to use discretion in calling it. In cases where the injury does not prevent transportation in the patrol wagons it will be used. The ambulance cost \$4,250 and is equipped with the most modern devices for the aid of the injured.

Experts Report Machine Better Than Specifications.

Williamsport, Pa.—Williamsport owns a combination motor chemical wagon. At a joint meeting of the Supply and Fire committees of Councils recently the Webb combination wagon, which had been in the city for some days and has been tested two or three times, was unanimously accepted. The acceptance followed a report given by Jerome Moltz, who with John Magee made a very thorough examination of the machine. The members present were Councilmen Ulman, Mosser, Spotts, Moltz, Burkhardt, Speaker, Rhoads, Young, Jones, Thomas, Simmons, Hagerman and Winters, chairman. Mayor Stabler and Frank F. Stryker, chief of the Fire Department, were also there. Mr. Moltz reported that the wagon lacks a few things of coming up to the specifications, as it has not the flared body and a gasoline gauge, but that on the other hand it exceeds the specifications in other more important things. The axles are heavier than called for; the frame is heavier, and the springs are heavier. Mr. Moltz was asked various questions and said that the committee would be fully justified in accepting the machine under the specifications. A business representative of the company, who was present, was called in and said that the firm will install a gasoline gauge and will deduct \$100 from the contract price since the flared body is not used. He said that a flared body can be substituted, but that it will take five weeks. There is no self-starter on the machine because a self-starter will not work properly on a high compression engine, such as is on the combination wagon. He said that perhaps it will work two-thirds of the time, but that the self-starter is a nuisance and that if it does not work it is necessary to wind the spring which operates it before the car can be started by cranking. He said that no big truck uses a self-starter and that in New York all cars equipped with self-starters have been dismantled and the equipment taken off. On motion of Councilman Spotts the committee unanimously voted to accept the machine with the \$100 deduction and the understanding that a gasoline gauge will be installed,

and that one or two men of the city will be instructed in the running of the car. A man will stay here and show the local firemen how to run it. The thanks of the committee were unanimously tendered to Messrs. Moltz and Magee for their work in inspecting the machine and the report of Mr. Moltz. The car will be located in No. 1 or No. 2 engine house. The matter of its resting place was left in the hands of Chief Stryker, Mayor Stabler and the chairmen of the Fire committees of Select and Common Councils.

Auto Tractor for Neversink.

Reading, Pa.—The Neversink Fire Company, of Reading, has received a new auto tractor, to replace a span of horses and haul the company's 90-horsepower engine.

Signal Lights on Patrol.

Richmond, Va.—To avoid accidents and warn drivers and pedestrians, the automobile police patrol of the First District was equipped with an automatic signal which will indicate the direction the vehicle will proceed. The device has been attached a few inches above the top of the car, and may be seen for a considerable distance. At night different lights will be shown, and during the day a hand will indicate the direction of the machine. A white light denotes that the patrol will continue its course ahead. A red light means it will turn to the left, a green light that it will move to the right.

Apparatus Stands Test.

Akron, O.—The new piece of Webb motor fire apparatus, which has recently been purchased by the city for Engine House No. 3, withstood the rigid test made upon it by the National Board of Fire Underwriters. Two lines of two feet each were attached to the engines, and a volume of 580 gallons per minute was discharged. Other tests were made with different sized nozzles and different hose lengths. It is said that the apparatus met the specifications required by the Board.

Delivers Fire Truck.

Olean, N. Y.—A very practical, as well as an extremely striking, chemical and hose motor truck has been delivered to the Fire Department of Olean by the Adams Bros. Company of Findlay, O. The apparatus is mounted on a 1½-ton truck chassis, and in addition to a 40-gallon chemical tank, is equipped with 200 feet of chemical hose, a 25-foot extension ladder, two fire axes, crow-bars, firemen's lanterns, searchlight, etc. The truck is finished in pure white and is striped with gold, giving it a very attractive appearance.

Saving by Auto Fire Apparatus.

Massillon, O.—The automobile fire-fighting apparatus has saved the city \$186.10 during the three months it has been in use, according to the report of Safety Director Shepley. The machine consumed twelve gallons of gasoline and four gallons of oil during the month of February with a total cost of \$3.25. The total cost of the apparatus to date has been \$35.90. With horses the cost would have been \$225, thus making a saving for the city of \$186.10.

Kress Firm Exhibit New Combination Fire Auto Truck.

Lawrence, Mass.—Members of the City Council and other city officials inspected and were much impressed with a new combination auto fire truck, built by the firm of O. F. Kress & Son, of Lawrence, which was exhibited and operated in Lawrence. The truck is a fine piece of workmanship. It carries 1,500 feet of hose, is equipped with wagon guns and ladders. Equipped with six cylinders, the truck can go at the rate of 60 miles an hour, being 60 horsepower. An exhibition of its speed was given along Essex street. Mr. Kress has the truck for sale for \$6,300 and expects to sell it to the Northampton Fire Department. Commissioner Lynch and Fire Chief Carey have recommended the purchase of a piece of motor apparatus, but Mayor Scanlon stated that although he was very

much impressed with the truck he did not think that there was much of an outlook of having the city buy one this year. The Kress truck went to Boston later, where it was on exhibition at the Boston Auto Show. Displayed on the sides of the apparatus were two large cards inscribed "Made in Lawrence. Boom Lawrence."

Auto Engine Fails to Run.

New York, N. Y.—Before an admiring crowd Cyrus C. Miller, President of the Borough of the Bronx, declared the new auto chemical hose wagon in service last night in the new fire house in Morris avenue between 167th and 168th streets. He had not finished speaking when the alarm sounded. Driven by Capt. Biggs the new wagon rolled from the house to answer its first alarm, went half a block up the street and came to a halt. The firemen worked for two hours to start the machine, but it refused to move, and Manhattan headquarters sent another horseless vehicle to take its place. The new wagon was taken to the repair shop.

GOVERNMENT AND FINANCE

Adopts Commission Form.

Fort Collins, Colo.—Fort Collins adopted the commission form of government by a majority of 337 votes. There were 673 votes in favor of the proposition and 336 opposed. The charter convention plan will be adopted.

Single Vote Changes City Rule.

Sea Isle City, N. J.—Commission form of government was adopted by a majority of one vote. A primary election will be held April 15 for the nomination of commissioners and the regular election will be held May 13.

Two Towns Consolidate.

Winston-Salem, N. C.—Winston-Salem and Salem will be one municipality after May 1. This was decided in an election held in which Winston, by a majority of 540 voted in favor of the consolidation, while Salem endorsed the proposition by a majority of 161. A street running east and west has been the dividing line between the two towns since Winston was established 55 years ago. Under the new order, in accordance with an act of the last legislature, the laws governing Winston will prevail under the new and larger city, which will be known as Winston-Salem and which will have a population, according to the last census, of 25,000.

STREET CLEANING AND REFUSE DISPOSAL

Saves Fuel by Perforated Bottoms to Garbage Wagons.

Topeka, Kan.—E. B. Stotts, city commissioner of parks and public buildings, has completed an invention that will cut in half the fuel bill of the municipal crematory, according to the results of recent tests. The Stotts invention is a perforated false bottom to be used in garbage wagons to drain off the water that under ordinary conditions is thrown on the crematory fires. The old garbage collection wagons carry from one to three barrels of water in the bottoms before the crematory is reached after the average collection. This water is dumped with the trash into the incinerating fires and as a result considerable coal is required to keep the fires in burning heat. The city commissioner's invention is a false bottom that drains the water from the garbage. This water is turned into a sewer before the load is dumped and the fires have only the dry and drained trash to burn. In tests that have been made by Superintendent Butterly under the supervision of Commissioner Stotts, it has been found that only half the fuel is needed to burn the garbage. In 1911 the crematory required nearly \$650 to buy fuel. Last year Commissioner Stotts cut this bill to less than \$450. He anticipates a cut of another \$200 on account of the new invention.

Garbage Dump May Become Playground.

Portland, Ore.—Where three years ago there was a filthy garbage dump there soon will be a children's playground, if the council complies with a request made by the Park Board and sets aside a portion of the tract surrounding the crematory for the installation of playground apparatus. The old dump has been eliminated by Superintendent Otis of the crematory, and the ground filled with ashes and clinkers from the furnaces and leveled. It is located in a district thickly populated with poor people, and the installation of a playground will be of great benefit to the neighborhood. The playgrounds will occupy between two and three acres of the tract.

"Clean Up" the Oranges.

Orange, N. J.—The week beginning April 14 was suggested as clean-up week in the Oranges at a conference arranged by the civic committee of the Woman's Club of Orange. Among those at the conference were Health Officer J. Scott MacNutt, of Orange; Dr. Ralph H. Hunt, of the East Orange Board of Health; Charles T. Gwynne, of the Orange Playground Commission; Mrs. James E. Cheesman, president of the Woman's Club; Mrs. Sidney M. Colgate, chairman of the civic committee; Dr. Sara C. Spottiswoode, Mrs. Wilson Farr and Mrs. Everett Yeaw, Mrs. James Minor Maghee, vice-president of the West Orange Improvement League; Miss Margaret Orr, visiting nurse, of the Anti-Tuberculosis League, and Miss Edith Rockwell Hall, field secretary of the civic committee. Dr. Hunt agreed to supervise the movement in East Orange; Mr. MacNutt volunteered for Orange, Mrs. Maghee for West Orange, Mrs. Farrand for South Orange. Messages of interest and willingness to co-operate were brought from Mayor Murray, of Orange, from the four health departments and from other officials in the four communities. Special effort will be made to interest the children.

RAPID TRANSIT

Helena Will Have the Pay-As-You Enter Cars.

Helena, Mont.—The Helena Light and Railway Company has decided to install pay-as-you-enter cars on its lines in the city, and will dispense with the services of conductors. The change is expected materially to reduce operating expenses. Details have not been worked out, but the change will be made as soon as the necessary equipment for the alteration of the cars is received.

Double-Deck Cars May Solve Traffic Problem.

Washington, D. C.—Double-deck cars capable of seating 100 persons may be introduced on the lines of the Washington Railway & Electric Company if an experiment for which the officials of the company are now preparing proves successful. One car of the proposed design has been ordered and will be used in the experiment. If found successful others will be added. That the double-deck car is the only solution of the traffic problem is the belief of many officials of the road. J. T. Moffett, superintendent of transportation, has explained that there is no room for the construction of more tracks along the streets over which the company operates, and on some of these tracks, he said, the company is now running as close a schedule as safety will permit. Small wheels, only 24 inches in diameter, are used in the new type of car so as to reduce their height. Seats on the first floor will be transverse, while those on the second floor will be placed back to back longitudinally. The top floor of the car will be reached by stairways leading from the center of each end of the car. Both the upper and lower decks of the car will be sheathed in steel plate. Latticed steel columns framed into the sheathing of both decks will be used instead of the corner posts as in many of the present cars. This will allow the entire sides to support the second deck. The new car will be 42 feet long and 8½ feet wide. A clear standing height of 6 feet 1 inch will be allowed. The entire height of the car will be 15 feet 3 inches.

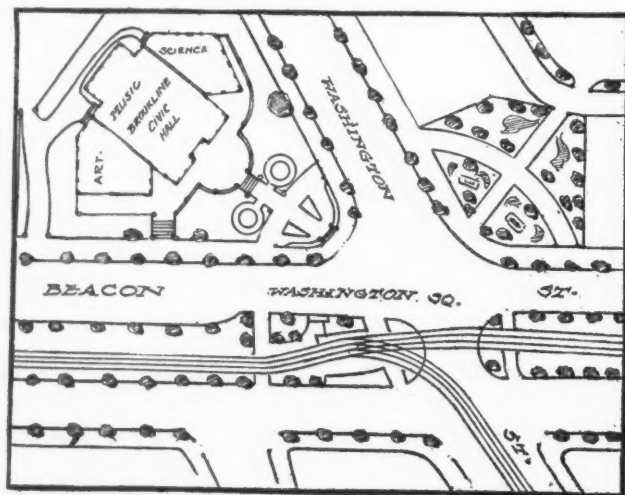
MISCELLANEOUS

White Disc Is Used to Control Traffic.

Pomona, Calif.—The "white spot system" used by Pomona to control traffic at busy corners has been given widespread publicity and will be the subject for an article in the American Motorist, the official paper of the American Automobile Association. A white disc 24 inches in diameter is painted in the center of street intersections and all vehicles must pass around these spots, as if they were policemen.

Draws Plans for Civic Centre.

Brookline, Mass.—Plans for the transformation of Washington square, in the centre of Brookline's residential district, and the erection of a civic centre devoted to the study of music, art and science, are herewith illustrated. These plans have been drawn up by J. Emery Harriman, and are offered by him to the town of Brookline. Mr. Harriman is a landscape architect, who has been connected with some of the great landscape enterprises of the East, having been for a year on the large estate of Cornelius Vanderbilt at Newport, and assisting in the development of the J. J. Van Alen estate and the Gammels estate. Washington square is at the corner of Beacon boulevard and Washington street and is the outlet of the Corey Hill residential district. There are at present no business houses of any kind on the northerly side of the road from Coolidge Corner to the reservoir. The northeastern corner of the square, according to Mr. Harriman's plans, where the property has recently been bought to erect a slaughterhouse, would be transformed into a pleasure park. Behind it lies the property occupied by the Driscoll school, with its large athletic ground. The town, Mr. Harriman believes, should take over this property, terrace it, build a long semi-circular concrete bench carefully and artistically modeled, place in the foreground low shrubs and flower gardens and green lawn, with room for two medium-sized statues, and in the background similar lawn and flower plots, with higher shrubs and a border of low trees. A central radial path, leading from the centre of the square through the park, up some steps, and around the school grounds, should connect the square with the school property. Across Washington street, on the large Jordan estate, now standing vacant, the civic centre building is planned. It is in three parts, large central hall, with a wing on each side. The centre is to be used for musical purposes, perhaps for the location of a splendid organ. The hall could be used for town concerts, civic pageants, for public plays and concerts by groups of citizens. The hall on the left is planned as a centre for art, and Mr. Harriman believes that enough citizens could be found in so wealthy a community with enough civic spirit to donate or lend to the town enough works of art to make a valuable collection. The other wing is to be dedicated to science and to contain exhibitions and demonstrations of an instructive nature, and also a branch of the Public



PROPOSED CIVIC CENTRE.

Library with scientific literature. The entire front of the building is set off with a concrete veranda, leaving room for seats and benches for outdoor concerts in summer time. A central walk, as on the northeast corner, radiates out from the centre of the square to the steps of the central music hall. On gala occasions 10,000 people could congregate in this open space and hear concerts and speechmaking or watch civic pageants and exhibitions.

Must Obey Hatpin Law.

New Orleans, La.—The police will be given special instructions to arrest any woman found violating the hatpin ordinance of the city recently passed. The ordinance provides that no hatpins shall protrude beyond the hat unless the point is covered. The penalty is a fine of \$1 to \$10 or imprisonment from six hours to five days.

For Macon Beautiful.

Macon, Ga.—For the purpose of having Macon one of the most sanitary as well as beautiful cities in the south, special committees from the ladies' auxiliary of the chamber of commerce, whose main object is to improve the city, are daily visiting the city schools and there inaugurating their ideas and plans among the children. The children have showed much enthusiasm over the beautification work and are now forming committees among themselves with a view of beautifying their school grounds and homes as much as possible. The idea of visiting the school children originated among the ladies of the civic federation, who now see they have taken a favorable step in asking for the co-operation of the school children in their work. Flower seeds of every description are now being delivered at each of the city schools to be planted on the grounds. The unsightly piles of trash and rubbish about on some of the school grounds have disappeared.

Mayor of Mitchell Altruistic Official.

Mitchell, S. D.—Mayor Hitchcock has taken up a new thing in the way of entertaining and benefiting the people of the city, and at the same time acquainting them with the needs of the commonwealth. He has arranged to give a series of municipal band concerts to help support the city band during the next two months, and also announced that he would start an industrial bureau wholly under the auspices of the city. He found in his investigations of the labor problem of the city that there were men and women who wanted to work, and there were those who wanted to employ people, but the two could not always find each other. For the employment of women the Mayor will establish a bureau at the city library, and for the men the chief of police will be held responsible for bringing the employer and the employee together. At the municipal concerts to be given once a week by the band, the Mayor will have a number of suggestions to offer on civic improvements for the residence part of Mitchell.

Will Plant 1,500 Trees Along Road.

El Paso, Tex.—On the promise of residents living along the county road to take care of trees if planted, 1500 Carolina poplars have been set out by the county, along the county road, beginning at a point four miles east of the city. The county commissioners some time ago agreed to line the county road with trees if those living along the highway would attend to them. With the exception of one or two instances, county judge A. S. J. Eylar reports this has been agreed to. Ten thousand Arizona ash trees have been set out on the farm of H. D. Camp on the island, and next spring when these trees have attained the height of four or five feet, they will be taken up and replanted along the county road. Mr. Camp stated that he would care for the trees until that time. The experimental slag road that has been built by the county near the viaduct, Judge Eylar stated, has proved a success. The road has been down two weeks. It is probable that the proposed county roads will all be built with a slag foundation and topped with asphalt macadam.

Municipal Nursery Planned.

Pasadena, Cal.—Park Superintendent Albrecht is planning to build a municipal nursery on some of the property owned by the city in the South Raymond-Glenarm district, if the city commission will approve his plans. At present whatever the city has in this line is located in the arroyo, and Mr. Albrecht says it is almost impossible to grow certain kinds of plants there because of the cold. The plan embraces growing plants for use in the Tournament of Roses, the somewhat nebulous idea being to have the city furnish, at cost, such flowers to those decorating vehicles, and thus aid in getting flowers for the pageant at a time when they are often difficult to obtain. In addition to the benefit which such a plant nursery would bestow at Tournament time, it is pointed out that the parks need plants, flowers and trees, and that a well-located nursery would supply this demand and at the same time save money. "It would not be necessary to get any more land than the city now has," said Mr. Albrecht, in discussing his proposition. "The city has plenty of well-located land for the purpose, and if the commissioners will authorize the plan, I shall be glad of the chance to put it into effect at once."

To Begin Campaign for Beautification of City.

East St. Louis, Ill.—E. H. Brown, chairman of the City Beautiful Committee of the East St. Louis Retail Merchants' Association, has announced that an active campaign will be launched by the committee to beautify the city. The first step will be a visit to all the public schools, during which the committee's plan of giving prizes to children for the planting of flowers in backyards and on vacant property throughout the city will be explained. Several thousand packages of seeds have been procured by the committee, and they will be given to children without cost. Mr. Brown said vacant lots in the city are now allowed to grow up in weeds, making an unsightly city. The children who plant flowers will be expected to cut the weeds. A series of prizes from \$1 to \$10 will be given for the best flower beds and gardens in different sections of the city.

New City Paper Cost Four Cents.

Atlantic City, N. J.—The new municipal journal, officially known as "Atlantic City Commission Government," made its initial appearance, the first number being published at Mayor Riddle's personal expense. Two thousand copies will be printed. The issue of two thousand copies is to cost \$75, which makes the cost of the issue three and three-fourths cents per copy. This is for the 12-page size with the cover, making in all 16 pages of printed or illustrated matter. The journal is an exceedingly well-printed and well-edited publication of twelve pages with bright yellow covers, the front bearing a most artistic design with two large views, one of the summer bathing beach and piers, the other of the Easter parade, with small etchings of City Hall and the lighthouse, and a fanciful border of marine flora, sea serpents and the municipal coat of arms. Inside are the pictures of the five commissioners, excellent likenesses and handsomely engraved. There is a list of city officials, financial reports comprehensively edited, reports from each of the several departments and the Mayor's message. A sketch of the growth of the Commission Form of Government is also contributed by Editor John L. Sprongle, Jr.

Build \$60,000 Public City Bath.

San Jose, Cal.—The transfer of 126 acres of land to the city of San Jose is completed, and this block of land has been added to the northeasterly limits of Alum Rock Park. It takes in the source of the water supply for the city reservation and also the beautiful falls, one of the fine attractions there. Along with this was deeded a right of way for the boulevard which leads from the entrance of the hill road to a point near the park cafe. There has also been donated a strip of land lying between the boulevard and park limits. This scenic road will be one of the most beautiful to be found in the county. From portions of it

the valley can be seen to advantage and at other places San Francisco Bay is visible. The roadway varies from 18 to 25 feet in width and enters the floor of the park at an average grade of $2\frac{3}{4}$ per cent. Plans have been nearly completed for a bath house, a pavilion and a music court, all of which will be situated together and near the children's play ground. The bath house will be the most elaborate structure in the park, costing in the neighborhood of \$60,000. It will be over 100 feet wide and will be 160 feet in length, containing fifty tubs and a plunge 79x90 feet. The commissioners have visited several of the best baths in the state, among them the one at Paso Robles and the Lurine in San Francisco. To get further ideas on building and equipment W. L. Prussia, who has planned to leave for the East, will visit a large number of the important baths in western New York, among them Stonybrook and Crystal Springs.

St. Paul Plans Lake Chain.

St. Paul, Minn.—A system of canals and boulevards, having White Bear Lake as the centre and bringing 15 of the 63 lakes of Ramsay County together into a stretch of 25 miles of waterways, is being planned by the business men of the city. Preliminary steps have already been taken for the realization of the project by the introduction of a bill in the legislature to permit a \$25,000 bond issue by the county to dredge out Spoon Lake and build canals from that body of water to Phalen Lake and Lake Pervais, forming a straight water course more than two miles long. Should the legislature pass the bill, as expected, this work can be done the coming summer and it is hoped that long before the next legislative session the plans for taking up the larger project, which means so much to this city and its suburbs, will be ready for approval. Speaking of the canal proposition, H. S. Fairchild, a former county commissioner said: "There is no reason why this county should not have the finest system of lakes in the United States. All that is needed to make these pretty bodies of water the centre of beautiful homes and scenes of enjoyment during the summer months is a little effort. The work can be done in a comparatively short time, and the people will gain the full benefit of what nature has given them. Within a few years St. Paul would have suburbs as beautiful as any in the country. There are already many homes among the lakes, but this number would be largely increased with the building of canals and boulevards."

Modern City Plan for San Antonio.

San Antonio, Tex.—San Antonio is to have a city plan. It will be comprehensive in every detail and will adequately provide for the growth and industrial progress of the Alamo City for half a century, and at the end of that period it will form the basis for another plan. Work will be started on the first city plan within the next ten days by Myron H. West, city planner and builder of Chicago, under a contract entered into by Mr. West and the city plan committee of the Chamber of Commerce. It will take a year to complete the plan and the work has been undertaken by Mr. West for \$4,000, this sum to be raised by the city plan committee with the aid of the city of San Antonio and its people.

Mr. West has presented a preliminary report of the work planned and in the matter of streets has touched on the most economical traffic conditions, their sanitation, safety and appearance, better lighting, and alignment of streets and establishment of small triangles and squares for breathing spots and for the installation of street decorations. He has also recommended the enactment of a wide tire ordinance, which will, by proper framing and gradual but systematic enforcement, eventually bring about the general sale and use of wide-tired wagons for heavy loads, which will serve to help preserve the pavements.

He urges that a municipal art commission be established to criticise and accept designs for street ornaments, bridges, public buildings, monuments, public comfort stations, etc., and that the overhead wires be installed underground.

LEGAL NEWS

A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

Sewers—Obstructions—Negligence.

Vitucci Importing Co v. City of Seattle.—A municipal corporation is not an insurer of the proper working of its sewers; and to charge it with damages caused by an obstruction therein negligence must be proved. A city is not entitled to notice of a defect or obstruction in one of its sewers as an essential of liability for damages, when it is such that it would have been discovered by reasonable inspection; it being the duty of the city to use ordinary care in causing its inspection. A person damaged by an obstruction in a sewer, causing an overflow in his basement, shows a prima facie case of negligence when he proves that there was an obstruction, the amount of consequential damages, and that there existed no extraordinary conditions, such as excessive floods or freshets.—Supreme Court of Washington, 130 P. R., 109.

Sewers—Construction—Taxpayer's Action.

Kelly v. Miller, Borough President, et al.—Under Greater New York Charter, providing for sewer construction, the governing power with reference to the construction of a sewer system and the maintenance of sewers is in the borough president, who has implied power to provide for sewer outlets within or without the corporate limits of his borough. A taxpayer of the city of New York was not entitled to restrain a sewer connection by the borough of the Bronx with a sewer in the city of Yonkers at the sole expense of the petitioners, on the condition that the connection might be discontinued by the city of New York at its election; it appearing that it was of great benefit to the latter city.—New York Supreme Court, 139 N. Y. S., 991.

Adoption of Private Sewer.

Brooks v. City of Maysville.—A city did not adopt a private sewer and become liable for its condition by cleaning out and repairing it for the purposes of sanitation, or by constructing a drain, manhole, and intake which did not conduct into the sewer any water which would not have otherwise flowed into it. A city was not liable for the overflow of a defective private sewer because it constructed a drain and intake to accelerate the flow of surface water into the sewer, where such construction did not divert extra water into the sewer.—Court of Appeals of Kentucky, 152 S. W. R., 789.

Discharge of Water—Liability.

Ronkosky v. City of Tacoma. *Hannam v. Same.*—Though a city, in grading a street across a gulch, be not required to furnish drainage for surface water, yet it, having exercised its discretionary power to do so, and constructed an adequate drain, is under a positive duty of exercising reasonable care to maintain its original efficiency, making it liable for its negligent failure in such duty. Where a city graded a street across a stream, and allowed a culvert constructed under it to get clogged, thereby causing a pond, which floated a house, and then, to drain the pond, cut the cribbing at the lower side of the fill, causing it to give way and the water to go out with a rush, wrecking the house, the city, if not liable for such wrecking as a consequence of its primary negligence in allowing the clogging, is liable if negligent in the cutting of the cribbing.—Supreme Court of Washington, 128 P. R., 2.

Wrongful Discharge of Sewage—Damages.

City of Henderson v. Herron.—A city using a creek for 18 years for surface drainage cannot invoke a prescriptive right thereby to use it for discharge for sewers. Where sewers emptying into a creek, to the damage of plaintiff's land, were constructed within five years before institution of suit for the damage sustained within that time, plaintiff's right to recover was not dependent on previous notice to abate, or affected by the statute of limitations. Where a landowner's right to recover for injuries to his

land from the use of a creek for drainage was limited to recent use as a discharge for sewers, and was not for prior use for discharge of surface waters, and the sewers were readily removable or capable of change preventing the injury, the injuries were temporary, permitting successive recoveries, so that damages should be limited to those accruing within five years next before institution of the suit. The measure of damages from temporary abatable injuries from wrongful discharge of sewage is the diminution in value of the use of the property during the continuance of the injury covered by the period for which the action is brought.—Court of Appeals of Kentucky, 153 N. W. R., 440.

Defective Sewer—Damages Recoverable.

Ginzler v. City of Birmingham.—Under a count of a complaint alleging damages to property from overflow on certain occasions, due to a defective sewer negligently constructed and maintained by the defendant city, recovery could be had only for the injury complained of that had accrued when the action was commenced, and not for permanent injury in general to the land. Damages could not be recovered for permanent depreciation in the market value of premises overflowed, where the complaint described the structure causing the injury merely as a "ditch or storm sewer," and did not aver that it was permanent, though the proof may have shown it to be permanent in character. A property owner can recover against a city for overflow due to the negligent construction of a sewer only such damages as have accrued at the commencement of his action; the presumption being that the city will remedy the defect.—Court of Appeals of Alabama, 60 S. R., 976.

Contract for Building Sewer—Construction.

Stover et al. v. City of Springfield et al.—Material changes in the construction of a district sewer in a city, made after the letting of the contract, by shortening one of the ditches called for and by adding laterals at places not called for, necessary to proper drainage for the entire district, were proper in view of the duty of the city to construct the sewer so as to properly accommodate the property owners of the district, and did not affect the validity of the special tax bills, especially as the contract provided for changes in the work with proportionate alteration in the price. Changes in the grade of the main pipe of a district sewer in a city lessening the cost of the work without impairing the service to be rendered do not vitiate the contract for the special tax bills. Where, in a suit to cancel special tax bills for the construction of a district sewer, it appeared that the area of the district as computed by the city engineer was not less than the actual area, the exclusion of evidence that a tract within the district had been omitted in computing the area was not prejudicial. A contract for the construction of a district sewer fixed the price per lineal foot for all excavation of 6 feet and under 8 feet at 30 cents; 8 feet and under 10 feet, 25 cents; * * * 16 feet and under 18 feet, 60 cents, etc.; price per lineal foot for rock trench per foot in depth, 25 cents; and declared that only such ledge rock, limestone as required blasting for removal should be estimated as rock excavation, and should be paid for by the lineal foot, depth of earth excavation to cease where rock excavation began. The evidence showed that in the doing of the work rock was found at the bottom of the ditch, but at what section or how deep the excavations were at places where rock was found was not shown. Held, that parol evidence of the practice in the city to allow the 25 cents per lineal foot for rock excavation in addition to the amount charged had earth extended to the bottom was admissible to show that the contractor was entitled to charge for excavation in accordance with such practice. A contract must be construed as a whole, and, where its terms are clear when so construed, the court must declare as a matter of law the meaning of the contract, but, where it is not clear, parol testimony may be resorted to to show the condition of the matter about which the contract was made. The court in construing an ambiguous contract may consider the construction placed on it by the parties themselves, as an aid in determining the intention of the parties by the language used.—Springfield Court of Appeals, Missouri, 152 S. W. R., 122.

NEWS OF THE SOCIETIES

Calendar of Meetings.

April 15-16.

TRI-STATE WATER AND LIGHT ASSOCIATION OF THE CAROLINAS AND GEORGIA.—Annual Convention, Charlotte, N. C. J. W. Neave, Secretary, Salisbury, N. C.

April 18.

UTAH SOCIETY OF ENGINEERS.—Annual Meeting, Salt Lake City, Utah. R. B. Ketchum, Secretary, 702 Newhouse Building, Salt Lake City, Utah.

April 18.

DETROIT ENGINEERING SOCIETY. Annual Meeting, Detroit, Mich. F. H. Mason, Secretary, 614 Moffatt Bldg., Detroit, Mich.

April 18-20.

SOUTHERN GAS ASSOCIATION. Annual Meeting, Charlotte, N. C. E. D. Brewer, Secretary, Atlanta, Ga.

April 24-25.

NATIONAL GOOD ROADS FEDERATION.—Annual meeting, Birmingham, Ala. J. A. Rountree, Secretary, Birmingham, Ala.

April 24-26.

IOWA STREET AND INTERURBAN RAILWAY ASSOCIATION. Annual Convention, Waterloo, Ia. H. E. Weeks, Secretary, Davenport, Ia.

May 5-7.

NATIONAL CONFERENCE ON CITY PLANNING.—Annual Meeting, Chicago, Ill. Flavel Shurtleff, Secretary, 16 Congress Street, Boston, Mass.

May 6-8.

GAS, ELECTRIC AND STREET RAILWAY ASSOCIATION OF OKLAHOMA.—Annual Convention, Oklahoma City, Okla. H. V. Bozell, Secretary, Norman, Okla.

May 6-10.

PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA.—Annual Meeting, Richmond, Va.—H. S. Braucher, Secretary, 1 Madison Ave., New York City.

May 12-14.

SOUTHWESTERN WATER WORKS ASSOCIATION.—Second Annual Convention, Fort Worth, Tex. E. L. Fulkerson, Secretary.

May 20-23.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Spring Meeting, Baltimore, Md. C. W. Rice, Secretary, 29 West 30th street, New York City.

June 23-28.

INTERNATIONAL ROADS CONGRESS.—Third Congress, London, England. W. Rees, Jeffreys Secretary, Queen Anne's Chambers, Broadway, Westminster, London, S. W.

June 23-28.

AMERICAN WATER WORKS ASSOCIATION. Thirty-third Annual Meeting, Minneapolis, Minn. John M. Diven, Secretary, 47 State street, Troy, N. Y.

July 22-25.

LEAGUE OF WISCONSIN MUNICIPALITIES. Annual Convention, Neenah, Wis.

August 25-30.

FOURTH INTERNATIONAL CONGRESS ON SCHOOL HYGIENE, Buffalo, N. Y. Dr. Thomas A. Storry, Secretary General, College of the City of New York.

August 26-28.

CENTRAL STATES WATER WORKS ASSOCIATION.—Seventeenth Annual Meeting, Cedar Point, O.—R. P. Bricker, Secretary, Shelby, O.

September 1-6.

INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS. Forty-first Annual Convention, Madison Square Garden, New York City. James McFall, Secretary, Roanoke, Va.

National Good Roads Federation.

Secretary J. A. Rountree has announced that the Federation will meet in Birmingham April 24-25.

Delegates are expected from every state in the Union. Invitations have been mailed to the governors of the various states requesting them to appoint fifty delegates from their respective states. Invitations have also been sent to the commissioners of agriculture of every state in the Union to come and participate in this confer-

ence. Delegates have been requested from every national, state and county good roads body, also delegates from automobile, commercial and farmers' organizations.

The object of this federation is to organize the advocates of improved highways in one grand consolidated body; to aid in securing federal, state and county air for the building of improved highways; to conduct an educational campaign and to awaken activity in highway improvement; to assist in organizing state, county and district associations. It is expected that a definite plan for organizing and consolidating all of the national good roads organizations in one great consolidated and concrete body will be worked out. It is a well-known fact that there are at least a dozen national good roads and highway associations in the United States, all working for one end, to have better roads, but what is needed most is **concerted action**. If there was only one plan presented for national aid in Congress there would be no trouble to get whatever the good roads people desired, just like the Rivers and Harbors Congress. At one time there were a dozen rivers and harbors organizations. Now they are all consolidated in one great body, and in consequence that department of the government secures whatever they desire.

It is confidently believed and it is hoped that the Birmingham meeting will be a great success and will start the movement which means so much for the cause of good roads throughout the country.

Reduced railroad rates have been secured. The newspapers of the country are taking an active interest in the movement; the citizens of Birmingham, through its commercial bodies, the Alabama Good Roads Association, the Jefferson County Good Roads Association, and other civic bodies, are lending every aid possible to make the meeting a great success.

One of the attractive features is that there will be a splendid exhibition of road making machinery and material and appliance, which will, also, include an exhibit from the United States Office of Public Roads, also of States and municipalities. They have been requested to send various views of their roads and streets, so this feature of the convention besides the splendid addresses and practical papers will be worth the attendance of good roads advocates from every State in the Union.

Electric Club of Chicago.

Answering a question at the meeting of the club on March 20, Charles F. Seyferlich, chief of the Chicago Fire Department, spoke in favorable terms of electric fire engines. He referred more particularly to portable electric pumps rather than to electrically operated vehicles with storage batteries.

His point was that electrically operated pumps obviate heavy boilers with the necessity of keeping a fire constantly going. Suitable outlets could be arranged near fire hydrants and the electric pumps connected to them. This would necessitate, of course, an unfailing source of electrical energy. The speaker at the meeting was J. C. McDonnell, assistant fire marshal and chief of the Bureau of Fire Prevention and Public Safety. Mr. McDonnell said that the steam fire engine is becoming a thing of the past. The gasoline motor-operated engine is more efficient and economical, but it in turn is only a stop-gap; the ultimate desideratum is a high-pressure water system. The speaker emphasized the point that much of the energy used in fighting fires might be spent to better advantage in preventing fires. However, efficient fire departments will always be needed, because when all reasonable means of prevention are exhausted there will still be fires due to carelessness or to causes beyond ordinary prudence and foresight.

Tri-State Water and Light Association.

Water works and light officials from North and South Carolina and Georgia will assemble at Charlotte April 15-16 for the annual convention of the Tri-State Water and Light Association of the Carolinas and Georgia. The program is being arranged and the meeting promises to be of much benefit to the water and light men. The following papers will be presented: J. L. Ludlow, Engineer, Winston-Salem, N. C., "Conservation of Purity of Public Water Supplies." M. F. Corin, Philadelphia, Pa., "Preventable Economic Losses in the Operation of a Boiler Plant and Remedies." G. H. White, Columbia, S. C., "The Effect Purification of the Water Supply Has Upon the General Health of a Community." A. M. Schoen, Chief Engineer of the Underwriters' Association, "Fire Prevention and Fire Protection."

The opening session of the convention will begin at 10.30 o'clock Tuesday morning, April 15, and adjournment will be reached about noon of April 16. Space will be provided for exhibits by firms interested in water works and light supplies and the indications are that the displays will be interesting to the members of the association.

The officers of the association are: W. F. Stieglitz, Columbia, president; W. E. Vest, Charlotte, first vice-president; George Hubbard, Madison, Ga., second vice-president; B. F. Erwin, Atlanta, third vice-president; J. W. Neave, Salisbury, N. C., secretary-treasurer.

The Tri-State association was organized in Columbia, June 28, 1911, and has enjoyed a steady growth since then. New members are being added to the roll and the Charlotte meeting will bring together a large gathering of water and light men. The object of the association is the advancement of knowledge of public water and light supply, furnished either by public or private ownership, and the manage-

ment of water works and light department; the exchange of information pertaining to the management of water works and water supply, for the mutual advancement of the interests of consumers and suppliers, and for the purpose of securing economy and uniformity in operation; the establishment and maintenance of a spirit of fraternity among its members by social intercourse and friendly exchange of information and experience.

Western Economic Society.

Inefficiency in city department of Chicago or any other city, can be wiped out, costly mistakes avoided, slovenly management remedied and, above all, politicians eliminated by the application of scientific management in the city hall, according to Morris L. Cooke, director of public works of Philadelphia, the first city in the nation to test the usefulness of the system in municipal affairs.

Mr. Cooke held out this hope in an address before the Western Economic Society, which met at Chicago, March 13, for a two days' discussion of scientific management.

Speaking from experience, Mr. Cooke said scientific management, if applied to Chicago, would bring about the following results:

Eliminate politics from the routine business of the city.

Double the efficiency of the fire and police departments and the Board of Public Works and the clerical employees.

Cause employees to feel sure of their jobs as long as they prove capable of holding them and do away with the fear that they will lose their positions with each change of administration.

Make employees realize that promotion is possible and that they will be given the first chance when a higher position becomes vacant.

"When I first went to work under Mayor Blankenburg to introduce scientific management in the city hall, the politicians said we would fail," said Mr. Cooke. "In spite of that, I had no trouble. I don't deal with politicians. Today the men are better satisfied, doing better work and are looking forward for promotion."

Pacific Coast Good Roads Association.

Plans are being perfected for a conference in Eureka, Cal., August 21 and 22 to organize a Pacific Coast Good Roads Association to promote good roads in California, Oregon and Washington. Governors Lister of Washington, West of Oregon and Johnson of California have promised to attend the conference. It is expected that Judge J. T. Ronald, President of the Pacific Highway Association, and Samuel Hill of Maryhill, Wash., will also be in attendance. Eureka is the largest town in the United States without a through railroad, and, except in the summer months, wholly dependent upon the sea for intercourse with the outside world. Some delegates, including the Governors of the three states, will journey from Redding or

Red Bluff across the Coast Range to Eureka.

Municipal Engineers of the City of New York.

At the regular meeting, Engineering Societies Building, March 26, a paper on the "Highways of America," illustrated with lantern slides, was presented by Foster Crowell, consulting engineer, Borough of Queens.

On Saturday afternoon, March 29, an inspection party of members met at the Municipal Building and, under guidance of engineers of the Public Service Commission, visited the Chambers street station of the Brooklyn Loop lines and the City Hall station of the Broadway subway. The first of these stations has been practically completed by the Bradley Contracting Co. The second is in course of construction by the Degnon Contracting Company.

PERSONALS

Blossom, Daniel H., city engineer, Salt Lake City, has resigned.

Bunting, George, Lawrence, Mass., has been reappointed Chief of Police.

Fales, Almon L., formerly superintending chemist of the sewage disposal works at Worcester, Mass., has joined the staff of Metcalf & Eddy, consulting engineers, Boston, Mass. Mr. Fales was succeeded at Worcester by Roy S. Lanphear.

Kenyon, Clarence A., Indianapolis, Ind., has been re-elected president of the Indiana Good Roads Association.

Moore, De Witt V., Indianapolis, Ind., has opened an office in the Merchants Bank building as a consulting engineer and architect.

Ober, Prince, Beverly, Mass., has been appointed Chief of the Fire Department.

Potter, Alexander, New York City, has been appointed by Chester Township Committee as consulting engineer on the sewer system of Moorestown, N. J., to confer with the township engineer, Earl Thompson.

Rowe, Wm. S., Cleveland, O., has been appointed Chief of the Police Department.

Sain, O. J. C., Olar, S. C., has been elected chief of police for the town of Bamberg, S. C.

Schley, Capt. Julian L., Washington, D. C., assistant to the engineer commissioner of the District of Columbia, has been appointed Executive Officer of the District Public Utilities Commission.

Sparks, Col. George W., Wilmington, Del., has been reappointed as a member of the Board of Street and Sewer Directors.

Waters, Edward A., Chief of the Philadelphia Fire Department, has resigned.

Watson, Wilbur J. & Company, engineers, Cleveland, O., have moved their offices to suite 1150 Leader building.

Wood, Charles Noah, city engineer of Norwalk, Conn., died March 19.

The following mayors have been elected:

Tennessee.

Lawrenceburg J. W. Garrett
Woodbury Dr. Thos. M. Smoot

Waterville, Me.—The following officers have been elected: City Clerk—Mark J. Bartlett; City Physician—Dr. A. U. Desjardins; City Engineer—E. C. Wilson; Street Commissioner—T. A. O'Donnell; Building Inspector—L. C. Pollard.

Belfast, Me.—The standing committees of the Belfast City Government for the coming year are composed of the following: Finance, Accounts and Claims—Alderman Black, Councilmen Wadsworth and Tuttle; Highways and Bridges—Alderman Bennett, Councilmen Pooler and Larrabee; Fire Department and City Property—Alderman Bennett, Councilmen Morrison and Darby; Sidewalks—Alderman Redman, Councilmen Morrison and Tuttle; Lights—Alderman Wing, Councilmen Wadsworth and Rogers; Sewers—Alderman Redman, Councilmen Pooler and Nichols.

Winthrop, Mass.—The following officers have been elected: Moderator, H. E. Foster; town clerk, E. S. French; chief engineer, J. A. Foster; road commissioner, E. S. McLaughlin.

Portland, Me.—The following city officers have been elected: City Clerk—Woodbury P. Harrington; Treasurer and Collector—Joseph F. Chaplin; City Auditor—Cornelius J. McCann; City Solicitor—Benjamin Coffin; City Physician—Frank H. Jordan; City Electrician—Charles H. Brimecomb; Member Board of Health, three years—Dr. Loring S. Lombard; Inspector of Buildings—Frank P. Coombs.

The following committees were appointed: Finance and Claims—Mayor Dyer, Aldermen West and Cobb; Public Works—Mayor Dyer, Aldermen Morse and Cash; New Streets—Mayor Dyer, Aldermen Knight and Morse; Street and Lights—Aldermen Foley, Brown and Knight; Fire Committee—Aldermen Cobb, Cash and West.

Newport News, Va.—Capt. Frank W. Darling, Dr. H. D. Howe, C. T. Holtzclaw, William C. L. Taliaferro and James M. Cummings elected to membership on the newly-created Commission for Civic Improvements.

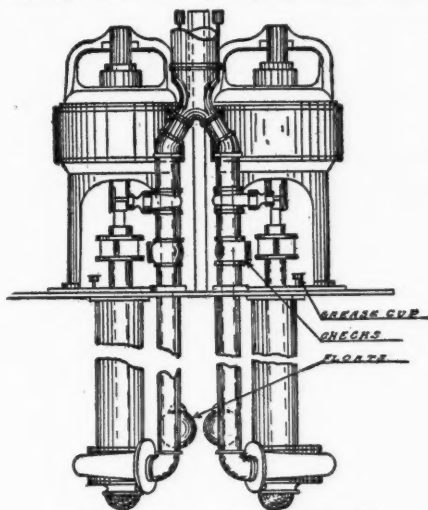
Sharon, Conn.—The following officers have been appointed: Town Clerk—George S. Willis; Health Officer—Dr. G. A. Skelton; Borough Engineer—Vincent B. Clark; Chief of Police—Wm. P. Robbins; Building Inspector—Thos. F. O'Connell.

The following members of the board were chosen to act on the following committees: Streets—Burgesses Ward and Finn; Fire—Burgesses Leggo and Stuart; Police—Burgesses Leggo and Ott; Nuisance and Garbage—Burgesses Stuart and Leggo; Street Lights—Burgesses Ott and Leggo; Sewers—Burgesses Ward and Finn; Finance—Burgesses Ott and Finn; Health—Burgesses Finn, Stuart and Leggo.

MUNICIPAL APPLIANCES

Economy Automatic Sewage Pumps.

Thomas & Smith, Inc., 116 N. Carpenter street, Chicago, Ill., make automatic sewage pumps shown in the illustration. A unit consists of a centrifugal pump driven by an electric motor. The pumps are made in any capacity for any head. They are of the highest grade, having machined parts and casings and are being efficiently used for pumping liquid con-



AUTOMATIC SEWAGE PUMP.

taining large percentages of solids. The illustration shows two distinct units so arranged that either one may be disabled without interfering with the operation of the other—and adjusted so that if one is not sufficient to handle all the sewage, the other will automatically operate till the proper level of the liquid in the basin has been restored.

Universal Crane and Excavator.

One of the most efficient machines on the line of the Passaic sewer, in New Jersey, is the C. O. Bartlett & Snow Company's Universal Crane and Excavator. On work of this kind, where the travel is slow and the swing does not exceed 180 degrees, this machine is claimed to be as efficient as a locomotive crane and to effect a considerable saving in first cost and ease of transportation. This machine has a much greater stability than the ordinary locomotive crane, due to its broad gauge, its low center of gravity, and to the fact that the boom and the bull wheel are the only parts that move when the boom is swung, the heavy engine and base always remaining at rest. This machine may be equipped to handle a hook bolt, clam-shell bucket, dragline scraper bucket, a dipper, a skip, or pile driver. At present the excavator has a $1\frac{1}{2}$ -cubic yard Owen clam shell bucket.

It consists of a base mounted on four wheels and supporting an electric hoisting engine. The base consists of structural members of standard size, rigidly connected and firmly braced. These

members are so arranged that they form pockets wherein ballast may be placed if found necessary. The wheels, four in number, are 21 inches diameter and of a high grade cast steel. They have double flanges and are specially designed to take care of the stresses and strains to which they are subjected. The axles are of hammered steel securely keyed to the wheels and run in bearings that are provided with bronze bushings and fitted with compression grease cups.

The hoist is a specially designed electric hoist with three tandem friction drums, each 14 inches diameter by 32 inches long between flanges, operated by Flory standard cone type friction. The drums are mounted in tiers in waterfall design, and there are interposed shafts and pinions between center, front and back drums, so that all drums run in the same direction. The upper drum gear is loose on the shaft to save friction losses. The drums are bronze bushed at both ends, the bushings 12 inches long. The hoist is provided with Werner-Flory patent boom with swinging gear, with swinging drums placed inside of the frame. A winch head is mounted on the center and forward drum shafts.

The hoist is driven by a 75-H.P. General Electric motor operating on two-phase current, 60-cycle, 220 volts. This motor is arranged with extended shaft and has an outboard bearing and is furnished with a solenoid brake. The motor base was specially designed to be sufficiently large to accommodate a 75-H.P. direct-current motor if at any time it is desired to substitute same.

The gearing is all of cast steel with machine-cut teeth. The drum and in-

termediate shafts are $3\frac{3}{8}$ inches diameter, bearings $6\frac{1}{2}$ inches long. Friction wheels are $39\frac{3}{8}$ inches in diameter, 6 inches face. The main gears have 70 teeth, 2 inches pitch, 6 inches face. The operating levers—three for friction, three for brakes, one for swinging gear, and controller—are all mounted in a battery on the deck of the excavator, forward of the hoist. They are set in notched quadrants.

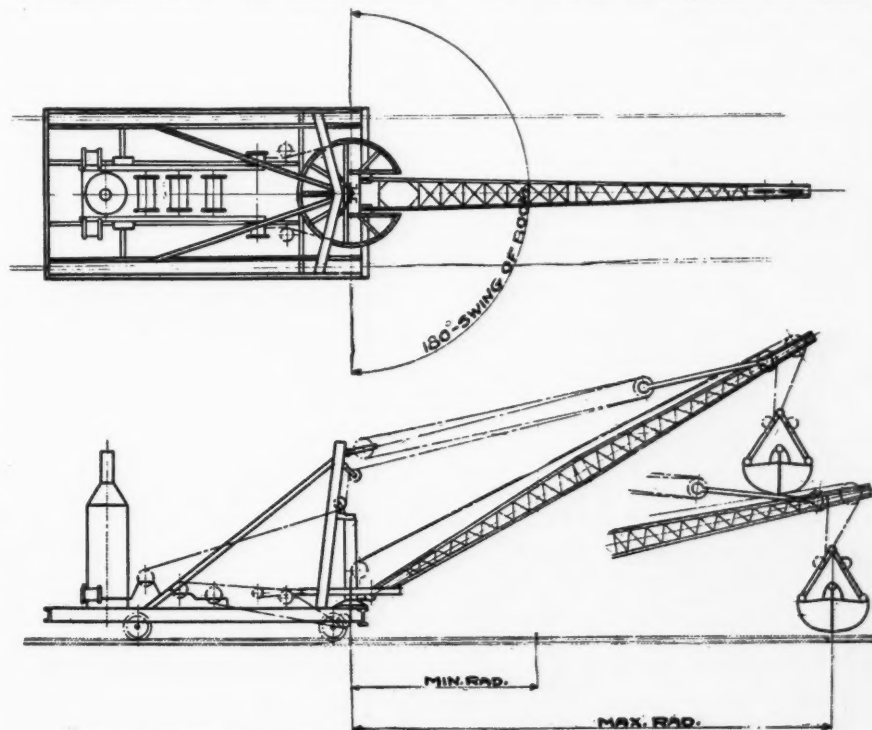
The total weight of the hoist is 25,000 pounds. The hoist was specially designed for heavy duty, clam shell excavating operation. The hoist was designed and manufactured by S. Flory Mfg. Co., Bangor, Pa., and sold through their New York agents, Lenher Engineering Co., to the contractor, A. T. Holmes.

The A-frame is of structural steel shapes rigidly connected. The feet of this frame rest upon two side beams of the base, to which members they are rigidly connected. The top is held rigid by two buck stays. This A-frame resembles the general design of the A-frame of a steam shovel.

The mast is composed of two channels, placed face to face, and held solidly together by means of a top and bottom casting. The top casting is pivoted into the cross bar of the A-frame. In addition to supporting the mast and boom feet the bottom casting supports the bull wheel. The bull wheel is made of channel iron rigidly fastened to this casting.

The boom, which is 45 feet center to center of pins, is composed of angles and plates, rigidly latticed. The boom being a rapidly moving member is built as light as is consistent to stiffness. The boom is designed for working with a hook block, clam shell buckets, or it may be equipped with drag scraper bucket attachment.

All sheaves throughout the machine



BARTLETT & SNOW UNIVERSAL CRANE AND EXCAVATOR.

are cast iron and are fitted with bronze bushings and compression grease cups. The score on these sheaves are deep and the diameter of ample size to give greatest efficiency to the cable. The sheaves turn upon fixed drawn steel pins.

The cables are of a high quality plow steel and are of ample size to handle the loads that may be imposed upon it.

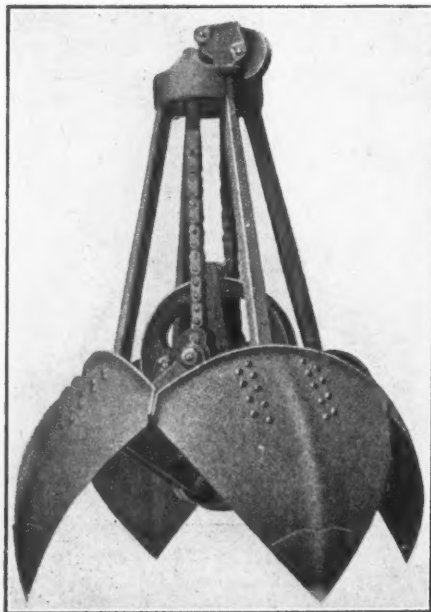
This machine is so designed that one man may operate it, and, as the efficiency of the outfit depends materially upon the efficiency of the operator, all possible conveniences are provided for him.

The construction of this machine allows it to be easily and quickly erected or knocked down for shipment, the separate members being light enough to load upon a wagon.

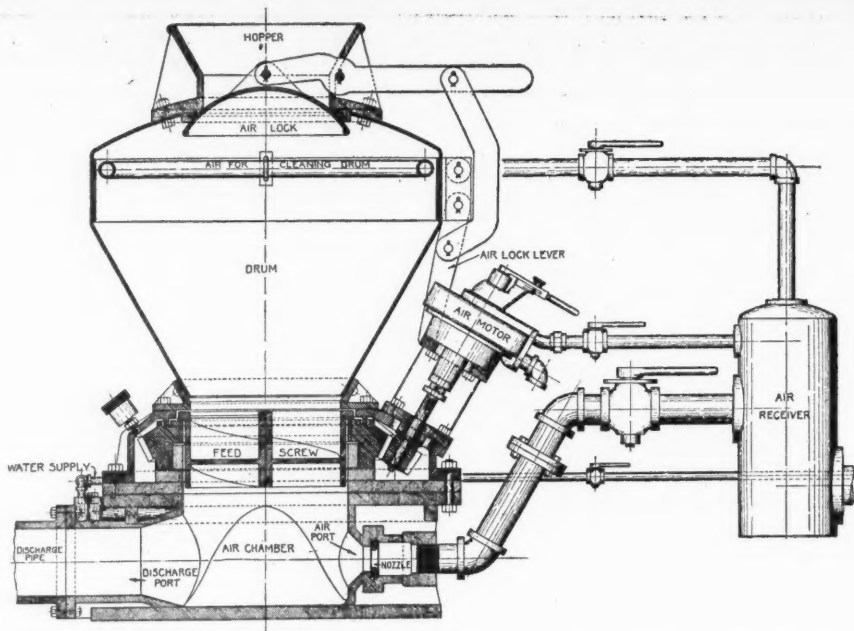
Hayward Orange-Peel Bucket.

The Hayward orange-peel bucket is used in connection with some sort of a derrick for all kinds of excavating and rehandling. It will handle fine wet sand and mud or even boulders. As the name implies the bucket is made of sections, like the peel of an orange. These sections are closed by four sets of toggles, one for each section of the bucket. The toggles are operated by a wheel around which is passed a line controlled by the engineer in charge of the derrick. Normally the weight of this wheel and the sections of the bucket holds it open. When the hoisting line of the bucket is slackened and the line over the wheel tightened the wheel is raised and the bucket closed and locked.

The Hayward bucket has certain merits as compared with other buckets of its class. It is made of materials of the best quality. The blades and blade arms are of flange steel and the connecting rods, connecting the blades to the upper centre are forged from a solid bar of steel. Every wearing part is furnished with replaceable bearings.



ORANGE-PEEL BUCKET OPEN.



COMPRESSED AIR MACHINE FOR MIXING AND DELIVERING CONCRETE.

bolts, etc., and furthermore corresponding parts are interchangeable. Replaceable outside cutting points are always a part of the equipment and inside points also may be used. These buckets are made in 15 sizes varying from 4 cubic feet to 4 cubic yards in capacity. The half-yard bucket weighs 2,200 pounds, has a diameter of 4 ft. 3 ins., is 6 ft. 2 ins. high. When open it has an outside diameter of 5 ft. 6 ins. and a height of 7 ft. 2 ins.

Concrete Blower.

The Concrete Blower Company, 103 Park avenue, New York City, manufacture machines for mixing, conveying and putting in place cement concrete. The machines are made in capacities running from 4 to 40 cubic feet. They handle each batch in about a minute. Concrete of any size aggregate may be used.

The machine consists of a hopper and a drum secured to an air chamber, the dry materials being fed from the hopper to the air current passing through the air chambers, by means of a worm rotated by an air motor. Water is added as the dry materials fall into the air current. In operation, the dry mixed or unmixed aggregates are placed in the drum and the air-locked door closed. A blast of compressed air is supplied to the receiving chamber through the nozzle. The feeding worm is rotated by the power from the motor, and a stream of water under pressure is passed into the receiving chamber. As the screw revolves, it feeds the aggregate into the air, the addition of water occurring simultaneously, the mixed concrete being taken up by the air and carried as a stream through the discharge pipe to the place for use. The possibility of the clogging of the pipe is eliminated by the means adopted for feeding the dry materials to the air current. To stop the operation, power is shut off at the motor, and no

material enters the air chamber. The manufacturers state that the blower and discharge pipe can be installed by two men in a day.

A pneumatic concrete blower outfit, suitable for placing 100 cubic yards of concrete in 8 hours, a distance of 500 feet from the blower, would consist of a blower of 10 cubic feet capacity; 500 feet of 6-inch pipe; necessary bends on a 5-ft. radius; an air compressor, having a capacity of 500 cubic feet per minute at 60-lbs. pressure, and an air receiver of 200 cubic feet capacity. With a plant of this description, 100 cubic yards of concrete can be mixed and conveyed through the discharge pipe a distance of 500 feet in 8 hours. The labor required to operate this plant, exclusive of the compressor crew, would consist of four laborers. The machine is said to be valuable as a means of filling forms for concrete tunnel linings.



ORANGE-PEEL BUCKET CLOSED.

THE WEEK'S CONTRACT NEWS

Relating to Municipal and Public Work—Street Improvements—Paving, Road Making, Cleaning and Sprinkling—Sewerage, Water Supply and Public Lighting—Fire Equipment and Supplies—Bridges and Concrete Work—Sanitation, Garbage and Waste Disposal—Police, Parks and Miscellaneous—Proposals and Awards.

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREETS AND ROADS				
Va.	Norton	4 p.m., Apr.	5..Macadam, 2 to 3 miles.....	T. M. Pepper, Mayor.
Ill.	Crete	10 a.m., Apr.	5..Hard roads, 10 miles.....	S. Rose, Town Clk.
Wis.	Wauwatosa	3 p.m., Apr.	5..Macadamizing several streets.....	C. R. Chandler, Chrm. B. P.W.
N. J.	Haledon	Apr.	7..Macadamizing, curbing, etc.....	J. E. Stewart, Boro. Clk.
Ala.	Gasden	8 p.m., Apr.	7..Concrete sidewalk, 1,334 sq. yds. curb and gutter.....	C. L. Marsh, C. Engr.
N. J.	Jersey City	2 p.m., Apr.	7..Improving Wegman Place.....	E. B. See, Clk.
N. J.	Newton	Noon, Apr.	7..Roads.....	R. L. Slater, Clk. Freeholders.
N. J.	Linden	8 p.m., Apr.	7..Sidewalks, macadam, crushed stone.....	J. L. Bauer, Engr.
N. J.	Glen Ridge	8 p.m., Apr.	7..Telford, asphalt binder, 3,300 yds.....	R. F. Davis, Secy.
Pa.	Chester	10 a.m., Apr.	7..Paving number of streets and s.dewalks.....	Wm. Provost, Jr., Chmn. Com.
Ind.	Salem	1.30 p.m., Apr.	7..Roads, 12 miles; cost, \$34,000.....	G. M. Johnson, Chrm. Comrs.
Ind.	Williamsport	9 a.m., Apr.	7..Gravel road, 7,755 lin. ft.....	D. H. Moffitt, Co. Aud.
Ind.	Fowler	1 p.m., Apr.	7..Gravel roads; cost, \$30,000.....	W. Mankey, Co. Aud.
N. J.	Bloomfield	8 p.m., Apr.	7..Telford with asphalt binder, 3,300 yds.....	R. L. Davis, Secy.
Pa.	Wilkes Barre	Noon, Apr.	7..Vitrified paving block.....	P. Nielon, Pres. Twnshp.
N. Y.	Yonkers	Apr.	7..Paving two streets.....	C. Clk.
Ind.	Williamsport	2 p.m., Apr.	7..Gravel roads; cost, \$15,000.....	D. H. Moffitt, Co. Aud.
Ind.	Greencastle	11 a.m., Apr.	7..Macadam, 9,615 lin. ft.....	C. L. Airhart, Co. Aud.
Fla.	Bartow	Noon, Apr.	7..Macadam.....	J. A. Johnson, Clerk Comrs.
O.	New Matamoras	Noon, Apr.	7..Vitrified blocks, drainage, &c.....	A. B. Huffman, Mayor.
Ind.	Kentland	2 p.m., Apr.	7..Gravel road.....	S. R. Sibelove, Co. Aud.
Ind.	Newport	10 a.m., Apr.	7..Macadamizing two roads.....	Roy Slater, Co. Aud.
Ind.	Rockport	2 p.m., Apr.	7..Paving and draining highway.....	J. T. Stevenson, Co. Aud.
N. D.	Dickinson	8 a.m., Apr.	7..Cement sidewalks and crossings.....	R. C. Hill, City Aud.
Ala.	Montgomery	Apr.	7..Grading and graveling 6 1/2 miles road.....	T. H. Edwards, Co. Engr.
Miss.	Tutwiler	Apr.	7..Concrete sidewalks.....	J. L. Donald, City Clk.
N. J.	Metuchen	8 p.m., Apr.	7..Concrete or blue stone flag sidewalks, 10,000 ft.....	H. S. Wilson, Boro. Clk.
Miss.	Sanford	Noon, Apr.	7..Earth and sand clay roads, 26 miles.....	J. F. Lott, Chrmn. Comrs.
N. J.	Westfield	April	7..Dolarway, 7,500 yds.; macadam, 7,200.....	A. W. Vars, Twn. Engr.
N. D.	Ellendale	8 p.m., Apr.	7..Cement sidewalks and crossings in 1913.....	J. King, City Aud.
N. D.	Fessenden	Apr.	7..Grading during 1913.....	F. B. Paul, Co. Aud.
N. D.	Jamestown	8 p.m., Apr.	7..Sidewalks in 1913.....	A. R. Thompson, City Aud.
N. D.	Kenmare	8 p.m., Apr.	7..Sidewalks during 1913.....	A. G. Engdahl, City Aud.
N. D.	Park River	7.30 p.m., Apr.	7..Sidewalks and crosswalks during 1913.....	F. J. Prochaska, City Aud.
N. D.	Wahpeton	7 p.m., Apr.	7..Sidewalk crossings, &c, in 1913.....	C. M. Olsen, City Aud.
Kan.	Emporia	5 p.m., Apr.	7..Sundry streets.....	F. H. Smith, City Clk.
N. Y.	New York	2 p.m., Apr.	8..Special granite block, sheet asphalt.....	Geo. McAneny, Boro. Pres.
Ind.	Spencer	2 p.m., Apr.	8..Pike road, 1 mile.....	G. W. Stwalley, Co. Aud.
O.	Warren	Noon, Apr.	8..Repaving 8,400 sq. yds. brick asphalt, creosoted block.....	C. L. Craig, Dir. Pub. Serv.
Wis.	Waukesha	Apr.	8..Asphalt macadam, 36,000 yds.....	M. R. Butler, C. Engr.
la.	Clarence	8 p.m., Apr.	8..Concrete, 7,500 sq. yds.....	S. McNeil, Twn. Clk.
Conn.	Wallingford	Apr.	8..Wood, brick, bitulithic, &c, 15,500 yds.....	Iowa Eng. Co., Clinton.
Ind.	Center Twp.	2 p.m., Apr.	8..Stone roads.....	J. E. Martin, Warfield.
Ind.	Delphi	Noon, Apr.	8..Gravel roads.....	Co. Clk.
Ind.	Noblesville	Apr.	8..Six gravel and macadam roads.....	M. G. Haun, Co. Aud.
Ind.	Paoli	Apr.	8..Gravel roads.....	Geo. Griffin, Aud.
Ind.	Noblesville	10 a.m., Apr.	8..Improving and paving six highways.....	E. A. Palmer, Aud.
Ind.	Covington	1.30 p.m., Apr.	8..Improving highway, 16,750 ft.....	Geo. Griffin, Co. Aud.
N. Y.	Utica	2 p.m., Apr.	9..Paving number of streets; various kinds.....	W. D. Gray, Co. Aud.
N. Y.	Brooklyn	11 a.m., Apr.	9..Sidewalks, asphalt pavements, etc.....	Ed. of Contract.
Kan.	McPherson	Apr.	9..Brick and asphaltic concrete.....	A. E. Steers, Boro. Pres.
Ind.	Angola	3 p.m., Apr.	9..Pavements, 7,900 yds.....	M. Hawkinson, C. Clk.
Ind.	Muncie	10 a.m., Apr.	9..Paving highway.....	Roy Hirst, C. Clk.
Ind.	Lagansport	Apr.	9..Macadam roads.....	Wm. Sutherland, Chrmn
Ind.	Crown Point	Noon, Apr.	9..Four gravel roads.....	J. E. Wallace, Co. Aud.
Ind.	Fort Wayne	10 a.m., Apr.	9..Approach to bridge.....	Co. Aud.
Pa.	Wilkes Barre	6 p.m., Apr.	9..Miscel. highway work in Hanover Twnshp.....	C. H. Brown, Co. Aud.
Ala.	Hamilton	Apr.	10..Two miles gravel road.....	F. C. Rowe, Secv. Comr.
La.	Shreveport	Apr.	10..Macadamizing & graveling 5 miles road.....	Marion Co. Comrs.
W. Va.	Fairmont	Noon, Apr.	10..Roads, 32.7 miles.....	Caddo Police Jury.
Ind.	Richmond	Apr.	12..Macadamizing 3 miles.....	J. F. Phillips, Co. Clk.
Kan.	Leavenworth	Noon, Apr.	12..Concrete culvert.....	J. R. Willson, Engr., Washin-
Ind.	Richmond	11 a.m., Apr.	12..Highway in Wayne Township.....	ton, Pa.
O.	Cleveland	11 a.m., Apr.	12..Improving stone roads.....	Co. Comrs.
Neb.	Hastings	Apr.	14..Repaving Second st.....	J. A. Hall, Co. Clk.
Sask.	Watrous	8 p.m., April	14..Concrete sidewalks, water mains and sewerage.....	L. S. Bowman, Co. Aud.
Tex.	Anderson	2.30 p.m., Apr.	14..Macadam and sand clay roads, 38 miles.....	J. S. Goldenbogan, Clk.
Pa.	Oil City	Apr.	14..Wood block or bituminous pavement, 9,340 sq. yds.; drainage.....	City Clk.
Wis.	West Allis	8 p.m., Apr.	14..Paving 28,000 sq. yds.....	E. Meadows, Mayor.
Mich.	Manistique	2 p.m., Apr.	15..Macadam, 3 miles.....	J. G. Browne, Engr.
Ohio.	Shreve	noon, April	15..Brick on concrete.....	G. F. Foess, C. Engr.
O.	Elvria	1 p.m., Apr.	17..Creosoted block on bridge.....	L. F. Fish, C. Clk.
O.	Cincinnati	Noon, Apr.	18..Improving three streets.....	J. M. Forshar, Co. Clerk.
Ill.	Lawrenceville	2 p.m., Apr.	19..Improving road, culverts, retaining walls, &c.....	C. Morgan, Clk.
O.	Ulrichsville	1 p.m., Apr.	21..Creosoted block bridge floor.....	F. L. Ellenberger, Clk.
Mich.	Saginaw	May	1..Paving several streets; cost, \$110,000.....	S. Struble, Pres. Comrs.
Fla.	Arcadia	Apr.	6..Sanitary sewer system.....	J. S. Spiker, Engr., Vincenn
N. J.	Camden	8 p.m., Apr.	7..Sewers in several streets.....	Ind.
				W. C. Shott, Co. Aud.
				H. H. Emyer, C. Engr.
SEWERAGE				
Fla.	Arcadia	Apr.	6..Sanitary sewer system.....	Guy Hayward, City Clk.
N. J.	Camden	8 p.m., Apr.	7..Sewers in several streets.....	J. C. Haines, Chrmn. Com.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
O., Toledo	Noon, Apr.	7.. Local sewers	F. G. Stockton, Secy.
Cal., Brawley	8 p.m., Apr.	7.. Furnishing sewer pipe, cement, &c.	T. N. Blais, C. Clk.
N. J., East Orange	3 p.m., Apr.	8.. Vitrified pipe, 2,400 ft., 8 to 24-in., and 1,600 ft. 24 to 60-in., reinforced concrete, etc.	A. Church, Secy. Comm.
Wash., Aberdeen	5 p.m., Apr.	9.. Sewers, 2 contracts	P. F. Clark, C. Clk.
Md., Baltimore	11 a.m., Apr.	9.. Vitrified pipe sewers, 8,500 ft. 8 to 10-in.	J. A. Preston, Mayor.
Ark., Pine Bluff	2 p.m., Apr.	10.. Vitrified pipe, 11,400 ft. 6 to 8-in.	F. R. Allen, Engr.
Ark., Pine Bluff	2 p.m., Apr.	10.. Clay pipe sewers, 11,400 ft. 6 to 8-in.	Comrs. Dist. 16.
Mich., Iron Mountain	9 a.m., Apr.	12.. Reinforced concrete pipe, 1,650 ft. 48-in., &c.	S. Beauparlant, C. Clk.
N. J., Cliffside Park	8 p.m., Apr.	14.. Trunk sewers	M. J. Murphy, Boro. Clk.
Ill., Dixon	Apr.	15.. Vitrified pipe, 14,000 ft. 6 to 15-in.	City Clk.
N. J., Newark	April	15.. Section 11, Passaic sewer; 6,500 ft. 10-ft. concrete.	Passaic Valley Sewerage Comrs
Sask., Saskatoon	Noon, Apr.	15.. Furnishing 101,000 ft. 5 to 24-in. sewer pipe.	R. E. Harrison, Mayor.
Wis., West Milwaukee	8 p.m., Apr.	15.. Sewage purification plant	S. W. Brew, Vil. Clk.
Md., Baltimore	11 a.m., Apr.	16.. Lateral sewers, 32,000 ft.	J. H. Preston, Pres. Bd.
Ont., Berlin	5 p.m., Apr.	17.. Concrete pipe, 11,913 ft. 48-in.; 8,500 ft. 18 & 30-in. vitrified pipe	H. Johnston, City Engr.
Cal., San Francisco	3 p.m., Apr.	19.. Sewers in park	Ed. of Pub. Wks.
N. J., Audubon	8 p.m., Apr.	21.. Vit. pipe, 66,000 ft. disposal works	G. L. Brown, Mayor
Pa., Chester	10 a.m., Apr.	22.. Sewers and disposal plant at Home	C. W. Baldwin, Dir.
Pa., Reading	2 p.m., Apr.	22.. Concrete and pipe sewers. Cost, \$170,000	E. B. Ulrich, City Engr.
Neb., Geneva	2 p.m., May	12.. Concrete pipe, 4,000 ft. 36-in.	F. B. Ashton, Dist. Secy.

WATER SUPPLY

Ill., Springfield	.....	10 a.m., Apr.	5.. Cast-iron pipe, 60 lengths, 10-in.	J. S. Schenett, Mayor.
N. Y., Yonkers	.....	3.30 p.m., Apr.	7.. Cast-iron pipe, 1,600 lengths of 4 to 8-in.	Bd. Contract & Supply.
Cal., Hunt'gton B'h.	.....	7.30 p.m., Apr.	7.. Fire plugs, 45	C. E. Lavering, C. Clk.
Wis., West Allis	.....	8 p.m., Apr.	7.. Water mains and hydrants	G. M. Leonard, Ch. B. P. Wk.
Ont., Brighton	.....	April	7.. Steel pipe, 33,000 ft. 6 and 10-in., etc.	R. J. Ross, Reeve.
Mich., Jackson	.....	10 a.m., Apr.	7.. Pumping engine, 4 miles mains, etc.	A. W. D. Hall, City Engr.
N. Y., Walden	.....	8 p.m., Apr.	8.. Steel stand pipe	S. Abrams, Pres. W. Comrs.
N. Y., New York	.....	11 a.m., Apr.	8.. Bronze riser valves and appurtenances	J. P. Morrissey, Secy.
O., Akron	.....	Noon, Apr.	8.. Concrete dam, 9,230 cu. yds.	R. M. P. Imore, Dir.
N. Y., Sonyea	.....	2 p.m., Apr.	8.. Improving water supply at Craig Colony	P. L. Lang, Pres. Mgrs.
Ont., Toronto	.....	Noon, Apr.	8.. C-i. valves and specials	H. C. Hocken, Mayor.
Sask., Regina	.....	noon, April	9.. C-i. pipe, 125,000 lin. ft. 6 to 24-in., lead, valves, brass goods, etc.	J. M. Mackay, Supt.
N. Y., New York	.....	2 p.m., Apr.	9.. High pressure fire service mains, &c.	H. S. Thompson, Comr.
Iowa, Miles	.....	2 p.m., Apr.	10.. Steel tank, gasoline engine & pump, c-i. pipe	Iowa Engineering Co.
Sask., Watrous	.....	8 p.m., Apr.	14.. Water pipes, sewers & concrete sidewalks	F. C. Wright, Secy.
Ill., Riverside	.....	8 p.m., Apr.	14.. Waterwork, centrifugal pump, electrical equipment pumping station	City Clk.
Ill., Evanston	.....	4 p.m., Apr.	14.. Mechanical filtration plant. Cap. 12,000,000 gal.	J. H. Moore, Comr.
Ind., Evansville	.....	Apr.	14.. Water tube boiler & stokers	Waterworks Trustees.
N. J., Jersey City	.....	Apr.	15.. Steel concrete conduit, cost \$500,000	C. A. Van Kuren, C. Engr.
Sask., N. Battleford	.....	8 p.m., Apr.	15.. C-i. and steel water mains, hydrants, &c.	D. S. Walker, Mayor.
Va., Alexandria	.....	1 p.m., Apr.	15.. Concrete dam, 17,500 cu. yds.	Alexandria Water Co.
Del., Rehoboth	.....	Apr.	15.. C-i. pipe, water tower. Cost, \$30,000	H. T. Downing, City Engr.
Miss., Tutwiler	.....	Apr.	15.. C-i. pipe, hydrant, valves, etc.	Mayor D. W. Fite.
Sask., Saskatoon	.....	Noon, Apr.	15.. Gate valves, fire hydrants, street castings, 10 miles c-i. pipe	F. E. Harrison, Mayor.
Mo., St. Louis	.....	Noon, Apr.	18.. Intake tower, tunnel & screen chamber. Cost, \$450,000.	E. F. Wall, Water Comr.
Ill., Springfield	.....	2 p.m., Apr.	21.. Pumping station filter plant, dam, reservoir, &c.	E. F. Whipp, Superv.
Ill., Anna	.....	2 p.m., Apr.	21.. Filter plant, 2,000,000 gal. reservoir, electric pumping station	Bd. of Administration.
Fla., Pensacola	.....	Noon, Apr.	22.. Reinforced concrete reservoir	L. E. Thornton, City Engr.
Wis., Milwaukee	.....	10.30 a.m., Apr.	24.. Concrete or brick intake tunnel, 4,000 ft., 12-ft. diameter.	F. G. Simmons, Comr. P. Wks.
Md., Baltimore	.....	Apr.	30.. Filtration plant; cost, \$1,750,000	Ed. of Awards.

LIGHTING AND POWER

Mont., Helena	.....	Apr.	7.. Ornamental lighting system	City Council.
Ia., Hawarden	.....	Apr.	7.. Corliss engines, boilers, generators, &c.	T. J. Reeves, C. Clk.
B. C., Vernon	.....	3 pm., April	11.. Diesel engine and generator	D. G. Tate, City Clk.
Sask., Swift Current	.....	April	14.. Electrical machinery	G. D. Mackie, Twn. Engr.
New Mex., Ft. Bayard	.....	6 p.m., Apr.	14.. Three transformers and one motor	Quartermaster.
Pa., Etna	.....	5 p.m., Apr.	14.. Constant current rectifier & controlling panel; 25 arc lamps	C. J. Armstrong, Clk.
La., New Orleans	.....	3 p.m., Apr.	18.. One 150 h-p. motor, contract 54-D	F. S. Shields, Sec. S & Wtr. Bd.
Sask., Regina	.....	April	30.. Synchronous motor generator or converter set	E. W. Bull, Supt.
S. D., Willow Lake	.....	May	1.. Electric light plant	J. F. Flindt, Aud.
Pa., Chester	.....	10 a.m., Apr.	7.. Tungsten lights for city hall	H. L. Morris, Chmn. Com.
Manitoba, Winnipeg	.....	11 a.m., May	15.. Large generators for turbines	M. Peterson, Secy.
Chile, Santiago	.....	Sept.	10.. Illuminating plant for port works	Comision de Puertos.

FIRE EQUIPMENT

O., Cincinnati	.....	Noon, Apr.	7.. Police and fire alarm at St. Benard	Thomas Peters, Dir. P. S.
Mont., Helena	.....	8 p.m., Apr.	7.. One combination motor hose wagon	J. A. Mattson, City Clk.
Minn., St. Paul	.....	2 p.m., Apr.	7.. Hose, 1,500 ft. 3/4-in.	G. T. Reddington, Secy. Pk. C.
Minn., Mankato	.....	Apr.	7.. Motor combination, chemical & hose wagon	J. A. Lulsdorff, Chief.
Pa., Kingston	.....	Apr.	7.. Fire hose, 1,000 ft. 2 1/2-in.	G. W. Carr, Ch. Com.
Sask., Saskatoon	.....	Apr.	15.. Two motor pumping engines	F. B. Harrison, Chr. Comrs.
Sask., Regina	.....	Apr.	21.. Motor apparatus, fire hose, etc.	City Comrs.

BRIDGES

N. J., N. Brunswick	.....	2.30 p.m., Apr.	7.. Reinforced concrete bridge	P. H. S. Hendricks, Dir.
Ind., Newport	.....	Apr.	7.. Concrete bridge, 150 ft. long	R. Slater, Co. Aud.
Tex., Houston	.....	Noon, Apr.	7.. Reinforced concrete viaduct; also lift bridge	D. C. Smith, Jr., Secy.
Mich., Jackson	.....	Apr.	7.. Concrete bridge, 54 ft. long	J. F. Harrison, Supt. Bd. P.W.
Ind., Selbville	.....	10 a.m., Apr.	8.. Wood block floor for bridge	F. W. Fagel, Co. Aud.
N. D., Hillsboro	.....	3 p.m., Apr.	8.. Bridges during 1913	Co. Comrs.
Ind., Albion	.....	2 p.m., Apr.	8.. Eleven bridges and culverts	J. C. Kimmell, Co. Aud.
Iowa, Charles City	.....	Noon, Apr.	9.. Five concrete bridges	H. B. Rosenkrans, Co. Aud.
N. Y., Schenectady	.....	2.30 p.m., Apr.	9.. Reconstrn. bridge	F. E. Johnson, Secv. Bd.
O., Hamilton	.....	10 a.m., Apr.	9.. Bridge over Miami and canal	W. W. Crawford, Co. Aud.
Ill., Freeburg	.....	10 a.m., Apr.	10.. Concrete bridge	J. Sintzel, Town Clk.
Ohio, Columbus	.....	April	11.. Miscellaneous bridge work	F. M. Sayre, Co. Aud.
Kan., Manhattan	.....	Noon, Apr.	11.. Number of bridges	G. H. Hungerford, Co. Clk.
Pa., Brookville	.....	Apr.	11.. Concrete arch	W. C. Beyerly, Ch. C. Comrs.
Va., Richmond	.....	Noon, Apr.	15.. Concrete bridge and viaduct approaches	C. E. Bolling, City Engr.
N. Y., Minetto	.....	About Apr.	15.. Reinforced concrete bridge	Concrete Steel Engr. Co., N. Y.
Tex., San Angelo	.....	Apr.	15.. Reinforced concrete bridge	J. B. Keating, Co. Clk.
Kan., Leavenworth	.....	Noon, Apr.	17.. Repairing culvert	J. A. Hall, Co. Clk.
Ill., Pecatonica	.....	2 p.m., Apr.	18.. Reinforced concrete bridge	J. S. Tarbert, Town Clk.
Neb., Lexington	.....	10 a.m., Apr.	22.. Concrete bridge	Co. Clk.
O., Hamilton	.....	Apr.	22.. Bridge over canal. Cost, \$14,000	Co. Comrs.
Ill., Ottawa	.....	1 p.m., Apr.	22.. Concrete bridge; cost, \$5,000	Co. Clk.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
N. Y.	West Vienna	Apr. 24	Concrete bridge; cost, \$20,000	A. O'Brien, Co. Engr.
O.	Akron	Apr. 24	Concrete bridge, 763 ft. long	C. L. Bower, Co. Clk.
MISCELLANEOUS				
Pa.	Chester	11 a.m., Apr.	7.. Removal and disposal of garbage	Wm. Provost, Jr., Chmn. Com.
N. J.	Newark	3.30 p.m., Apr.	7.. One or more motor comb. patrol wagons	John Baader, Pres. Com.
S. D.	Ashley	2 p.m., Apr.	7.. Metal culverts	G. F. George, Co. Aud.
O.	St. Bernard	Apr.	7.. Police auto and police telephone system	Ed. Trustees.
O.	Columbus	Noon, Apr.	7.. Incinerator plant for disposal of rubbish	S. A. Kinnear, Dir. P. S.
O.	Toledo	Noon, Apr.	7.. Steam tandem roller, two surface heaters, fire wagon, &c.	F. G. Stockton, Secy.
Minn.	St. Paul	Apr.	7.. Erecting shelter building and dock	G. T. Reddington, Secy. Parks.
Pa.	Mount Oliver	8 p.m., Apr.	7.. Street hose, 300 ft.	G. A. Hoffman, Clk.
N. Y.	White Plains	Apr.	7.. Altering village building	City Clk.
O.	Cincinnati	Noon, Apr.	7.. Auto police for St. Benard	P. Peters, Dir. P. Safety.
Ill.	Chicago	11 a.m., Apr.	8.. Steam hoisting engine, derrick, buckets, pump, two-ton jacks	L. E. McGann, D. P. S.
N. D.	Washburn	3 p.m., Apr.	8.. Fresno scrapers, twenty No. 2 & five road plows	T. Thompson, Co. Aud.
Va.	Richmond	Noon, Apr.	8.. Police station, furnishing one motor cycle, 16 bicycles	G. E. Pollock, Secy.
Ark.	Ashdown	Apr.	8.. Concrete jail	W. M. Sykes, Chmn. Comrs.
Ill.	Glenview	7 p.m., Apr.	8.. Jail and village engine house	G. V. Appleyard, Clk.
N. Y.	Utica	2 p.m., Apr.	9.. Extension of subway	Ed. of Contract.
Okla.	Bartlesville	Apr.	9.. Court house and jail	S. M. Brown, Co. Comrs.
N. Y.	Brooklyn	Apr.	9.. Building at pipe yard	H. S. Thompson, Comr.
Ala.	Jasper	Noon, Apr.	10.. Jail building	J. W. Shepherd, Probate Judge
Ill.	Springfield	Noon, Apr.	10.. Patrol wagon, 6-cylinder, 40-HP	G. F. Coe, Acting Mayor.
La.	Fairfield	1 p.m., Apr.	12.. Jail and Sheriff's residence	W. Stewart, Chmn.
N. D.	Fargo	Apr.	14.. Jail and sheriff's residence	A. Leech, Co. Aud.
N. Y.	Schenectady	2.30 p.m., Apr.	16.. Garbage disposal plant machinery	W. T. Wooley, City Engr.
O.	Toledo	10 a.m., Apr.	17.. Refrigerating and ice-making machinery	C. J. Sanzenbacher, Co. Aud.
Ga.	Savannah	Noon, Apr.	25.. Incinerator for garbage, 130 tons cap. or destructor	R. J. Davant, Mayor.
N. Y.	Lockport	About May	1.. Garbage disposal plant, cost \$8,000	J. F. Freshee, C. Engr.

STREETS AND ROADS

Dadeville, Ala.—Plans are being worked out by Mayor Douville and board of aldermen to begin work in near future to macadamize main streets of Dadeville. First work to be undertaken will be on LaFayette st., from Central of Georgia depot to Methodist church and three blocks on Broadway st., east of county court house. Work under consideration will cost about \$15,000.

Los Angeles, Cal.—Paving of Sunset boulevard, from Main to Marion sts., has been authorized.

Pomona, Cal.—Citizens will vote on \$50,000 bond issue for good roads on April 7.

Santa Cruz, Cal.—Chamber of Commerce has passed resolutions recommending purchase of State highway bonds.

San Mateo, Cal.—The \$1,250,000 bond issue for system of boulevards in San Mateo county, which will be voted on at special election April 8, has been indorsed at mass meeting.

Delmar, Del.—Delaware side of Delmar has voted in favor of \$30,000 bond issue for improving streets and installing sewerage system.

Fort Myers, Fla.—Bond issue of \$47,000 has been voted for street paving.

Key West, Fla.—At special meeting of county commissioners it was unanimously decided to build road between island of Key West and Stock island, adjoining island, canal not to exceed cost of \$3,000.

St. Augustine, Fla.—County Commissioners are preparing for road bond election.

Tampa, Fla.—City Council has ordered board of public works to lay eleven blocks of paving along Bayshore boulevard from Magnolia to South Rome aves. and to use asphalt block as paving material.

Macon, Ga.—Paving of Main st. has been authorized.

Macon, Ga.—Petition has been filed with City Council by sundry citizens owning property and living on Daly st., South side, asking that the street be improved.

McDonough, Ga.—The McDonough board of trade has appointed committee to co-operate with road commissioner of Henry county for still greater improvements in the roads of the county.

Rome, Ga.—Fourth ave., from East First to East Second st., will be paved.

Lewiston, Idaho—Street improvements for hill district, east of Eighth street, have been approved by city council.

Des Moines, Ia.—City Council has adopted resolutions for improving various streets.

Chico, Ill.—Board of Improvements have ordered paving of following streets with vitrified brick: Holbrook ave., from the north side of 21st st. to St. Charles st., where it intersects Walnut st., Fourth st., from Ohio st. to easterly side of Washington ave., Sixth st., from Ohio st. to easterly side of Washington ave., Tenth st., from Ohio st. to the

easterly side of Poplar st., Twelfth st., from Ohio st. to easterly side of Poplar st.

Waterloo, Ia.—Lafayette st., from Fourth st. to C. G. W. tracks, and Fourth st., from Franklin st. to I. C. tracks, will be repaved with asphalt during coming summer. City auditor has been instructed to advertise for bids for this work.

Topeka, Kan.—County Commissioners and Township Board will have joint meeting to complete plans for graveling road from brickyard bridge to South Silver Lake road. This road is about a mile in length and improvements will cost about \$1,800.

Lexington, Ky.—Board of City Commissioners has passed resolutions for improvement of various streets.

Donaldsonville, La.—Special election held throughout first road district of Ascension Parish has resulted in adoption of proposition to authorize Police Jury to issue bonds to amount of \$35,000 for purpose of constructing permanent gravel roads along river on west bank from lower Iberville to upper St. James line, and from Donaldsonville and Port Barrow to Assumption line on both sides of Bayou Lafourche.

Baltimore, Md.—Ordinance authorizing widening of Center st., from St. Paul to Devis sts., has been referred by Board of Estimates to Commission for Opening Streets.

Baltimore, Md.—Baltimore st., from Fallsway to St. Paul st., will shortly be repaved, according to City Engineer McCay.

Baltimore, Md.—Final action on plan to repave Baltimore st., from Fallsway to St. Paul st., will be taken shortly by Paving Commission.

Cumberland, Md.—James P. Gaffney, city engineer, has submitted estimate of paving and grading new location of Water st. Amount given is \$6,910.

Cumberland, Md.—Bond issue is advocated for improvement of city's streets.

Blackstone, Mass.—Sum of \$7,000 has been appropriated for rebuilding of Main st.

Gloucester, Mass.—Order appropriating \$1,000 for improvement of Concord st. has been adopted.

Haverhill, Mass.—Chairman Sohler of state highway commission has notified Representative Samuel I. Collins of Amesbury, chairman of legislative committee on roads and bridges, that he will build two miles of highway between Salisbury square and Salisbury beach.

Lawrence, Mass.—City Council has voted to create loan of \$75,000 for street paving. It was voted to block pave, with granite blocks, South Broadway, from the North canal bridge to Boston & Lowell tracks; Merrimack st., easterly, from South Broadway, with old blocks taken from South Broadway, and Jackson st., from Haverhill st. to Essex st. There is a balance of \$60,000 left over from paving appropriation of last year, making \$135,000 in all for street improvements this year. The \$60,000 balance will be used in paving section of

West st., Andover st., and Elm st., thoroughfares decided upon last year.

Swampscott, Mass.—Appropriation of \$25,300 has been made for highway department.

Flint, Mich.—Bonds for construction of pavements, estimated to cost \$480,000, have been authorized by vote of taxpayers. Plans are being prepared and work will shortly be advertised. H. E. Terry, City Engineer.

Flint, Mich.—Citizens have voted \$120,000 for street paving and \$41,000 for graveling streets.

Kalamazoo, Mich.—More than two miles of pavement will be constructed during the year and much repair work will be undertaken. Following are streets that will be paved as authorized by Council: Lincoln ave., 6,650 sq. yds.; South Burdick st., 5,953 sq. yds.; Gull st., 4,057 yds.; Dutton st., 5,032 yds.; Cedar st., 4,800 yds.; Stuart ave., 3,381 yds.; Ransom st., 1,225 yds.; Alley north of main street running east from Burdick, 395 yds.; Alley between Burdick and Edwards sts., 845 yds.; Bellevue place, from end of pavement to Oakland drive, 622 yds. Council also voted to re-surface Portage st., from Washington ave. to Reed st., and to repair West Main st. pavement from Church st. to Michigan Central tracks.

Rochester, Minn.—Initial step for construction of state highway in Olmsted county, under Elwell law, that will be the beginning of movement for concrete highway from Rochester to St. Paul, has been taken when county commissioners of Olmsted county by unanimous vote accepted petition of those interested for building of such road from Stewartville to this city, distance of about fourteen miles. Petition will now be submitted to State Highway Commission.

St. Paul, Minn.—Property owners on Hastings ave. have been advised by Board of Public Works that hearing on paving of street would be held March 27, and on Snelling ave. on March 31.

Biloxi, Miss.—Laurel Commissioners will at once publish notices providing for paving of Fifth, Sixth and Seventh ave. and Fifth st., including about fifteen blocks in residence section, work to begin as soon as paving in business district is completed. Sheet asphalt will be used on residence streets.

St. Joseph, Mo.—Ordinance has been ordered prepared for paving with concrete of Monterey, between Sixth and Eighth sts. City engineer has been ordered to prepare ordinance for paving with coal tar macadam 30th st., from Lafayette to Monterey.

St. Joseph, Mo.—Bids will be asked by Board of Public Works for paving of Mulberry, 22d to 24th sts.; Sacramento, 28th to 30th; Mary, Sixth to Ninth; alley between Sixth and Seventh, from Messaline to Sylvan. Bids will also be asked for grading Angelique, between 29th and 30th, and the alley between 16th and 17th, from Charles to Edmond.

Camden, N. J.—Ordinance has been adopted for laying out and opening Ridgway st., in Gloucester City.

Elizabeth, N. J.—Ordinances have been adopted authorizing improvement of various streets.

Long Branch, N. J.—Bids for paving have been rejected by Board of Commissioners. The city will resurface Sairs, Morris, Park and Rockwell aves., instead of putting them out to lowest bidder.

Newton, N. J.—Estimating that cost of macadamizing roads would be \$3,000 a mile, it has been announced that town committee had decided to improve road from Pine Tree, town limit, in direction of Stanhope, up Main st. to Cochran House, down Spring st. to courthouse, and from that point either down Mill or Water st. to town limit, depending on what route to Branchville is to be improved. Road from freight station down Sparta ave. to town limit will also be improved.

Paterson, N. J.—For repair of county roads, board of freeholders will expend \$150,000 this year. Of this amount \$60,000 will be expended on county roads located within this city. Proposals for work will be advertised for shortly.

Perth Amboy, N. J.—Resolutions have been adopted for paving of various streets. W. La Roe, City Clerk.

Trenton, N. J.—Movement is on foot to have Harbourton Road macadamized from Jacob's Creek to Bird's Corner.

Albany, N. Y.—Bill is being considered authorizing the paving with brick of section of Syracuse-Oswego state highway.

Brooklyn, N. Y.—Widening of Myrtle ave. is under consideration.

Albion, N. Y.—Plans for Route 30 now in hands of County Highway Superintendent Waldo, of Albion, call for paved street in East ave. and West ave. for total distance of 1.84 miles, commencing at Olney farm line west of greenhouse and extending westward to village corporation line at Coveney farm. This will be first highway paved through village. Cost of paving is estimated at \$31,000 a mile, brick paving to be 16 feet wide with concrete edging.

Auburn, N. Y.—When supervisors convene for special session within few weeks, proposition to improve 100 miles or more of Cayuga county roads will be placed before them by County Superintendent of Highways J. Charles Dayton. It is planned to build highways at once instead of waiting for state to construct roads designated.

Mt. Pleasant, N. Y.—Petitions have been received asking for paving of various streets.

Newburg, N. Y.—Controller Prendergast of New York city has given his approval to application made to Board of Estimate for \$1,300,000 in corporate stock for laying of forty-mile road of vitrified brick in Catskill aqueduct region around Ashokaan reservoir. Road is planned to connect two state roads.

Rochester, N. Y.—Following final ordinances have been adopted: Berkeley st asphalt pavement, \$5,600; Tallinger alley asphalt pavement, \$2,000; Hempstead alley asphalt pavement, \$2,000; Taylor st. widening, \$1,000; Portland ave. pavement from Clifford ave. to Norton st., \$51,000.

Schenectady, N. Y.—Ordinances have been adopted for various street improvements.

Silver Springs, N. Y.—At meeting of Town Board of Gainesville highway work for coming year was laid out. Roads on which permanent improvements are to be made are as follows: From Lucas' corners east to Castile town line; from south line of corporation of Silver Springs south to Sherman's corners; from Bishop's corners west to corporation line of Gainesville; from Gainesville south to Pike town line; from Delhi st. north to Warsaw town line and what is known as George Ensign road, north of Gainesville Center.

Utica, N. Y.—Ordinances are being considered for paving and improving of various streets.

Watertown, N. Y.—Highway between this city and Black River will be repaired immediately.

Watertown, N. Y.—Paving of State st. from Colorado ave. to point near Gifford st. is under consideration.

Washington, N. C.—Citizens of Beaufort county will vote on question of bond issue for road improvement.

Mandan, N. D.—Mandan city commission and Mandan Commercial club have joined hands in planning campaign of municipal improvement during coming season, and one of most important pieces of work contemplated is pavement of principal business streets of city.

Albuquerque, N. M.—Plans are being made for construction of about four miles of pavement.

Akron, O.—Ordinances have been passed authorizing paving of number of streets.

Akron, O.—Bids will be received at office of James McCausland, City Auditor, for purchase of bonds in sum of \$4,500 for improvement of Jefferson ave.

Cincinnati, O.—County Engineer Cowen has submitted communication estimating cost of improvements on Bridge-town pike, from Ferguson road to Harrison pike, at \$11,811.90, and estimate of the cost of changing course of Anderson Ferry road, from Hillside ave. to top of hill, at \$47,645.

Cincinnati, O.—Board of County Commissioners has announced estimated cost of improvements on pikes and bridges in this county, totaling sum of \$140,000, as follows: Improvement of Oak ave. in Symmes Township, \$1,447.80; concrete culvert on Shawnee road, near Wooster pike, \$21,162; improvement of Chester ave., Symmes Township, \$7,292; improvement of Rapid Run pike, \$12,184.50; improvement of Miami ave., \$1,753; improvement of Sand Run pike, \$1,500; improvement of Highland ave., \$1,194.50; improvement of Batavia pike, \$42,560; improvement of Shaker road, from county line to New Haven, \$15,959; improvement of Mill road, from Hamilton pike to Butler County line, \$22,283; improvement of Country Club pike, \$13,050. Bids will be received at offices of the board.

Cincinnati, O.—Elmwood Place Council proposes to spend about \$20,000 this summer in improvement of Elmwood, Linden, Locust and McGregor sts. It was proposed to lay tarvia binding on streets.

Miles, O.—Bids will be received at office of City Auditor until 2 p. m. April 27 for purchase of bonds in sum of \$6,540 for improvement of Beaver st.; sum of \$13,420 for improvement of Cedar st., and \$5,449 for improvement of Church st. Homer Thomas, Clerk.

Toledo, O.—Council has adopted resolution declaring it necessary to pave Jefferson ave., from Ontario st. to Collingwood ave.

Toledo, O.—Ordinance declaring it necessary to borrow \$15,000 for constructing sidewalks during year has been passed by Council.

Toledo, O.—Board of County Commissioners of Lucas county will sell to highest bidder \$90,697.67 worth of bonds for improving of roads. Bids will be received up to 10 a. m., April 18.

Altoona, Pa.—Ordinances have been approved for paving of various streets.

Johnstown, Pa.—Paving of Ferndale ave., Ferndale, under foot-front plan has been decided upon by Ferndale Council. Portion of avenue to be paved is that between Station and Louisa sts.

Meadville, Pa.—Bill providing for bond issue for \$60,000 for purpose of paving and storm sewerage portions of 11 streets of city has passed third and final reading.

Reading, Pa.—Common Council bill No. 80, calling for paving of Pear st., between Hudson and Green sts. with Belgian block, has been introduced by Mr. Ritter and referred to committees on finance and highways.

Spring Grove, Pa.—Petition is being circulated by taxpayers of North Codorus township for purpose of having constructed state road through part of eastern and central portion of that township.

York, Pa.—Considerable paving work is being planned.

Williamsport, Pa.—Highway committee of councils has approved ordinances providing for paving of Fourth st., between Arch and Poplar sts., and Park ave., between Hepburn and Campbell sts.

Milesville, S. D.—Movement has been started to construct model highway from Milesville westward across country traversed by Spotted Bear, Council Bear, Bridger and Ash creeks. It is planned to have county stand part of expense.

Dallas, Tex.—Board of Commissioners has adopted resolution offered by Commissioner J. E. Lee on recommendation of City Engineer J. M. Preston directing repairing of sidewalks on Bryan st., between Pacific and Garrett aves.

Midland, Tex.—County Commissioners of Midland county have appointed April 22 as date of election to decide whether county shall issue \$50,000 bonds for construction of good roads in this county.

Waxahachie, Tex.—At meeting of City Council City Secretary was instructed to advertise for bids for paving West Main st., from Monroe st. to Katy Railroad crossing, distance of nearly a mile.

Specifications cover all kinds of paving material.

Winnit, Tex.—Commissioners' Precinct No. 4, of Chambers County, has held election for purpose of voting on issuing of bonds to amount of \$100,000 for building and shelling roads. Money will be used for roads to connect with shell roads of Harris County and road to Liberty County line will be built connecting with road from Dayton.

Salt Lake City, Utah.—A delegation from Midvale has appeared before county commissioners with petition that county extend highway No. 13, the main thoroughfare of Midvale, from south city limits to connection with state road into Sandy.

Portsmouth, Va.—Paving of High st. is under consideration.

Richmond, Va.—Bids have been invited for granolithic curbs and gutter on south side of Floyd ave., from Davis to Elm st.

Richmond, Va.—Bids have been invited by Administrative Board for grading of Park ave., from Boulevard to West st.; also for grading Sheppard st., from Park ave. to Leonard, and Leonard, from Monument ave. to West st.

Richmond, Va.—Bids have been invited by Administrative Board for laying granolithic curbs and gutter on various streets.

Everett, Wash.—Representatives from all points of Island County are considering proposition to bond county for amount not exceeding \$90,000 to build 55 miles of new road which by filling missing links would complete trunk lines north and south through both Whidby and Camano Islands.

Seattle, Wash.—Resolutions have been adopted for improvement of various streets.

Seattle, Wash.—Resolution providing for improvement of West Atlantic st. from Forty-fourth Ave. S. W. to Forty-fifth ave. S., by sewers, has been adopted.

Snohomish, Wash.—City council has started what is a plan to ultimately pave main residence part of city, by ordering resolutions prepared for paving main route from First st. to Northern Pacific depot, and Ave. C its full length.

Spokane, Wash.—Resolution has been passed for improvement of Market st. by asphalt macadam.

Tacoma, Wash.—City Council has ordered improvement, by paving, of North 26th st., from Union to Proctor st., and of Proctor st., from 26th to 29th st.

Tacoma, Wash.—Within few days county engineers will undertake survey and inspection of three-mile strip of road in forest reserve, link in highway to Mount Tacoma, to determine cost of macadamizing the surface.

Madrid, Spain.—Question of repaving streets of city has been agitated for some years, and special board which has been making study of this problem has formulated plan and submitted it to city authorities, who are likely to adopt it with slight modifications. When adopted, two months will be allowed for bids to be submitted. Adopted plan, together with statement of all work to be done under it, will be published in official Gaceta de Madrid. In order that American contractors may be familiar with conditions under which this work must be done, translation of the scheme is forwarded. For particulars address Bureau of Manufactures.

CONTRACTS AWARDED.

Glendora, Cal.—By City Trustees to George C. Paonessa, Story Bldg., Los Angeles, for following street improvements; Bennet Ave., at \$9,427, Minnehaha ave. at \$5,765, Michigan ave., \$34,243.

Pasadena, Cal.—By City Council for improvement of Atchison st., to W. A. Dantonville, at following bid: Paving per square foot, 4½ cts.; sidewalk, per square foot, 8½ cts.; grading, per lineal foot, 75 cts.; curz, per lineal foot, 25 cts.; gutter, per square foot, 14 cts.

Plymouth, Conn.—For improvement of highway on main road between Andrew Terry Company and Bullhead Bridge by constructing permanent concrete road between these two points, distance of 2,600 feet, with side retaining wall along the embankment to the Pierson Engineering and Construction Company of Bristol.

Plymouth, Conn.—It has been decided to make repairs on road between Terryville and Plymouth Center. Contract for this work has been let to the Pierson Engineering and Construction Company, of Bristol.

Key West, Fla.—By Board of Public Works, contract for paving Whitehead st. and the streets adjacent to naval station to Southern Asphalt & Construction Co., represented by J. W. Crawford. There was only one bid submitted, and this states that same kind of vitrified brick used in former work will be used in this. Figures are \$2.14 a sq. yd. curbing \$1 a foot, resetting 21 cts., and 60 cts. for headers.

Rushville, Ind.—For constructing brick and macadam road, 16,107 ft. long in Rushville City and Township, to De Golyer & Masters, of Seymour, by County Comrs., at \$40,000.

South Bend, Ind.—To Hoban & Roach, contract for construction of concrete pavement on Garfield court, by Board of Public Works. The contract price was \$1,066.

Union City, Ind.—To Jas. Garvey, of New Castle, contract for furnishing 800,000 brick for street improvements at cost of about \$42,000.

Galesburg, Ill.—By Board of Local Improvements to J. B. McAuley, Galesburg, at \$40,745, for paving Main st. with brick, and at \$7,833, for paving Waters st., from Cherry to Broad sts. Other bidders were: Burlington Construction Co., Burlington, Ia., at \$41,318, for Main st. only; P. H. Tiernan, Macomb, Ill., \$41,344 and \$7,968; Gund-Graham Co., Freeport, Ill., \$41,711, and \$8,121; E. R. Harding Co., Racine, Wis., \$41,832 and \$8,081.

Belle Plaine, Ia.—For 17 blocks of asphaltic concrete pavement to Des Moines Asphalt Paving Co., of Des Moines, Ia., at \$54,404.

Cedar Rapids, Ia.—By City Council, contract for 15,000 lin. ft. curbing and gutter on Mt. Vernon road, 13th and other streets to Percy P. Smith at \$9,807.

Dubuque, Ia.—By City Council contract for paving of 10 blocks of 24th st. to Kenety & Lee, of Dubuque, at \$2.48 per sq. yd. for creosote blocks outside the car tracks and \$3 per sq. yd. for creosote blocks inside car tracks.

Washington, Ia.—For paving from plans of Chas. P. Chase, of Clinton, as follows: (a) 4,600 cu. yds. grading; (b) 7,500 lin. ft. combined curb and gutter; (c) 12,000 sq. yds. bituminous coated cement concrete; (d) totals: J. J. Ryan, Muscatine, (a) 47 cts., (b) 57 cts., (c) 1.40, (d) \$23,287; McCarthy Improv. Co., Davenport, (a) 55 cts., (b) 66 cts., (c) \$1.38, (d) \$24,040; D. E. Keeler Construction Co., Davenport, (a) 45 cts., (b) 73 cts., (c) \$1.42, (d) \$24,585; Kaw Paving Co., Topeka, Kan., (a) 50 cts., (b) 68 cts., (c) \$1.36, (d) \$23,720; J. J. McKeone, Washington, (a) 40 cts., (b) 65 cts., (c) \$1.35, (d) \$22,915, awarded contract.

Waterloo, Ia.—Contracts for construction of sidewalks on number of streets have been awarded to Mishler & Hawver Co. Bids were received from three contractors but there was but little difference in the bids. Bids were as follows: Mishler & Hawver, 5-4 walks, 48 cts.; 15-ft. walks, \$1.50; 5-in. alley crossings, 48 cts. William Hettis, 5-4 walks, 48½ cts.; 15-ft. walks, \$1.50; 5-in. alley crossings, 48½ cts. W. T. Owings, 5-4 walks, 50 cts.; 15-ft. walks, \$1.50; 5-in. alley crossings, 55 cts.

Lexington, Ky.—To Carey & Reed, at \$1 per square yard, for reconstruction of Mentelle Park with Type C asphalt.

Lexington, Ky.—Under contract entered into by Road Supervisor C. F. Estill and William Lutes & Co. and subsequently approved by Fiscal Court, following turnpikes of county will be improved with crushed rock, sprinkled and rolled: Todd's road, 600 rods; Bryant Station, 100 rods; Liberty road, 50 rods; Muir Station and Briar Hill roads, 200 rods; Johnson, to the county line, 30 rods; to Clintonville, 40 rods; Newtown road, Norwood's to Ironworks road, 40 rods; Ironworks road, 10 rods, and the Maysville road, 150 rods.

Louisville, Ky.—By Bd. of Public Wks. for paving of Main st. with wood blocks to Louisville Asphalt Paving Co., of Louisville, at \$7,647.

Bay City, Mich.—Three companies—two local and one foreign company—will share all paving to be done in Bay City this year. The Cleveland Trinidad Paving Co., only successful outside bidder was awarded contracts for paving of Third st., Wenona ave., Sixth st., Ohio st. and 15th st., from Garfield to Water st. All of these pavements are to be asphalt. Patrick Ryan, local contractor, was given four street paving contracts and contract for paving traction company's right-of-way on Farragut st. Ryan will lay brick pavements on Saginaw st., from Sixth to Ninth st., on Ninth st., from Washington ave. to Wa-

ter st.; on Water st., from McKinley ave., to Ninth st., and on Seventh st., from Washington ave. to Water st. Hugh Campbell & Son, also local contractor, were given ten paving contracts for alleys in the business section, at \$993.15 per contract, each pavement being one block long.

Crystal Falls, Mich.—By Iron county road commissioners, contract to gravel Tully road to D. F. Boyle & Co., of Crystal Falls, their bid being the lowest for work. Contract amounts to about \$9,000.

Mount Clemens, Mich.—By city council, contract to R. M. Adams at \$1.97 per sq. yd. for about 11,300 sq. yd. of brick pavement on Cherry, Pine and East sts. A. A. Devantini is City Clk.

Ely, Minn.—Seventeen bidders submitted bids for city improvements to be made this year. Lowest bidder on total amount of work to be done bid as low as \$32,500 while highest bidder wanted \$45,791.12. Lowest bidder for proposed cement walks was D. H. Clough & Co., of Duluth, at \$24,464.15.

St. Joseph, Mo.—Bids for large amount of public improvement work have been opened by Board of Public Works, and six contracts have been awarded, while others will be laid up temporarily. Olson Schmidt Construction Co. was given contract for resurfacing with brick, Fourth st., from Felix to Jule. The Metropolitan Paving Co. was awarded the resurfacing with asphalt on brick of Francis, from Twelfth to Thirteenth sts., while same company was awarded the paving with mineral rubber of Monterey from 28th to 29th. A lot of sidewalks in northwestern part of the city have been awarded to the Land Construction Co., at 14.9 cts. a square foot. These walks will be of artificial stone, and will be constructed as to be used when the streets are curbed and paved. The walks will be laid on Market, Prospect to Second; St. Paul, Dewey to Third; Dolman, Dewey to Third; Highland ave., Dewey to Second; Main, St. Paul to Dolman, and Highland to north city limits. This will be about a mile of double paving. The Kelley Construction Co. was awarded the sidewalk on Messanie, from 26th to 28th sts. Work upon which action was deferred includes resurfacing with asphalt of Eleventh, Francis to Frederick ave.; Mary, Sixth to Ninth, asphaltic concrete; Angellique, Fifth to Tenth, sheet asphalt, and sewers in districts 32, 26, 88 and 139.

Cascade, Mont.—To Jas. Kennedy, of Fargo, N. D., contract for grading and laying concrete sidewalks at about \$6,000.

Trenton, N. J.—Supreme Court has handed down decision to award contract for paving of two streets to lowest bidder, Thomas J. McGovern of Trenton, at \$1.52 per sq. yd. City had awarded same to Charles A. Reid & Co., at \$1.81 per sq. yd.

West Long Branch, N. J.—For grading and graveling Wall st., from Locust ave. to Whale Pond road, to Frank C. Byram at \$1,699.70.

Lawrence, N. Y.—To Wm. Wieberg, contract for paving Church st., at \$8,683.

Syracuse, N. Y.—The Warner-Quinlan Co., 438 S. Salina st., was low bidder on contract for paving Beverly road from Stolp ave. to Crossett st., at \$1,093.80 for asphalt with stone curbing. Guy B. Dickson was low bidder on specifications calling for vitrified brick and stone curbing with figure of \$1,010.30. Mr. Dickson was also low on bids for paving Hawley ave., from Teall ave. to Lodi st. On standard stone pavement his figures were as follows: Sandstone, \$53.952.75; vitrified brick, \$39,919; asphalt, \$38,722.35.

Utica, N. Y.—By Board of Contract & Supply, for pavement repairs, to Harry W. Roberts Co., of Utica. Only one bid was received. Prices submitted were: For asphalt resurfacing, \$1.30 per square yard; for six-inch concrete in place and excavation (small cuts), \$1.30 per square yard, (large cuts) \$1.15 per square yard. It is estimated that there are about 7,400 square yards of resurfacing to be done.

Bellaire, O.—For resurfacing Rock Hill pike, Bellaire and Neff pike and Brooks Run pike, all in Pultney Township, total distance of about 15 miles, from plans of D. A. Elkin, Zweig Bldg., to Seiple & Wolf, of Toledo, at \$80,340, for glutrin and slag. Rosser & Maloney, of Bellaire, bid for this work \$88,140.

London, Ohio.—By city council, to J. O. Shoup & Co., Dayton, Ohio, at \$27,597, for paving Main St. with brick. Other bidders were W. E. McHugh, Springfield, \$28,054; Jerry Neville, London, \$28,968; Bentz Bros., Columbus, \$30,033; Lambert Bros. & Wirt, Dela-

ware, \$30,490; Asphalt Block Co., Toledo, \$34,601.

Marion, O.—For macadamizing Brooks Free Turnpike road, to Clifford A. Owens, of Owens Station, at \$12,467.

Medina, O.—To Geo. S. Mellert, of Medina, contract for improving River Road 2, at \$9,975.

Sandusky, O.—By Director of Public Service to M. J. Callan and Andrews Asphalt Paving Co., for improvement of First st. and Central Ave., respectively. R. L. Hagar is City Engr.

Claysville, Pa.—By Borough Council, contract to M. F. Rhodes & Son, Versailles, N. Y., at approximately \$27,000, for paving Main st.

Wilkes-Barre, Pa.—J. D. Williams, of E. Market st., was lowest bidder for resurfacing or repaving with asphalt South Washington st., between Northampton and Hazle sts. Bid presented by Mr. Williams was \$1.27 a square yard for resurfacing; \$2.04 for a new pave on a concrete base; 25 cts. a foot for resetting curb and 75 cts. a foot for new curb. Warner & Quinlan's bid was \$1.44 for resurfacing, \$2.12 for new pave, 40 cts. for resetting curb and 90 cts. for new curb.

Athens, Tenn.—To Arthur Prather, for macadamizing streets and public square at \$1.49 per sq. yd.

Galveston, Tex.—Recommendation of Commissioner Austin that A. C. Falligant be awarded contract for paving alley between Eighteenth and Nineteenth sts. and Aves. C and D has been adopted. This contract totals \$993.05.

Galveston, Tex.—Contract for paving Church st., between Twenty-second and Twenty-fourth sts. has been awarded to P. J. Vautrin as lowest bidder. Contract totaled \$6,589.71.

Richmond, Va.—Contracts for granolithic curbs and gutters have been awarded as follows: To A. W. McClay, west side of Addison, from Hanover st. to alley; west side of Elm st., from Floyd to Grove; north and south sides of N st., from 34th st. to alley; north and south sides of M st., from 32d to 33d st.; north and south sides of N st., from 31st to 33d st. To Javi Perkins Construction Co., east and west sides of 34d st., from M to N; north and south sides of Beverly st., from Allen ave. to Davis ave. To A. Q. Billings, west side of Sycamore, from Main to Floyd; east and west sides of Mulberry, Hanover to Stuart ave.

Bellingham, Wash.—By City Council, contract to Puget Sound Bridge & Dredging Co., Seattle, Wash., at \$13,804 for clearing, filling and otherwise improving six blocks of waterfront.

Everett, Wash.—For asphaltting of Twenty-second st., from Rucker to Hoyt aves., to the Atlas Construction Co., at \$1,600.

Watertown, Wis.—For improvement of North Eighth st., Dewey ave., part of Western ave. and public alleys in block 5 of Second Ward. Proposals are based on unsurfaced, reinforced concrete pavement, of a very rich mixture, 1 to 1½ to 2½, and on bituminous surfaced, reinforced concrete pavement of a leaner mixture, 1 to 2 to 3. Contract awarded to E. L. Bartlett—Unsurfaced—Western ave., \$25,543.46; North Eighth st. and Dewey ave., \$17,369.96; alleys, \$789.75. Other bids as follows: Advance Construction Co.—Unsurfaced—Western ave., \$26,204.26; North Eighth and Dewey ave., \$18,171.20; alleys, \$805.69. Surfaced—Western ave., \$30,585.51; North Eighth st. and Dewey ave., \$20,476.20; alleys, \$890.44. F. H. Lehmann—Unsurfaced—Western ave., \$26,490; North Eighth st. and Dewey ave., \$18,246.71; alleys, \$816.04. C. Johnson—Unsurfaced—Western ave., \$27,910.82; North Eighth st. and Dewey ave., \$19,514.07; alleys, \$852.56. Surfaced—Western ave., \$29,170.82; North Eighth st. and Dewey ave., \$21,173.67. J. Rasmussen & Sons Co.—Unsurfaced—Western ave., \$26,382.26; North Eighth st. and Dewey ave., \$18,303.20. G. H. Stanchfield—Unsurfaced—Western ave., \$26,358.95; North Eighth st. and Dewey ave., \$18,288.57. Surfaced—Western ave., \$28,302.20. North Eighth st. and Dewey ave., \$19,671.57.

South Vancouver, B. C.—For paving of the Kingsway, between the municipal boundaries, to Columbian Bitulithic Paving Co., at \$235,169.

SEWERAGE

Los Angeles, Cal.—Sewers in East Wilmington and Wilmington park districts are urged by Dr. L. M. Powers, health commissioner.

Los Angeles, Cal.—Definite recommendations will be made shortly in regard to disposal of sewage at mouth of the outfall sewer at Hyperion, according to preliminary report made to board of public works by city engineer.

Pasadena, Cal.—By City Council, for construction of sewers on various streets to Peter Grbovach, at \$14,888.

Sacramento, Cal.—Extension of sewer system is under consideration.

Hartford, Conn.—Taxpayers will shortly vote on resolution appropriating \$35,000 for construction of proposed Maple ave. sewer system; also \$17,000 for constructing continuation of Homestead ave. intercepting sewer.

Delmar, Del.—Delaware side of Delmar has voted for a \$30,000 bond issue for installing sewerage system and improving streets.

Daytona, Fla.—City has retained Clyde Potts, civil and sanitary engineer, of 30 Church st., New York City, to report on sanitary conditions of city, and to prepare plans for sewerage system and sewage disposal works.

Fort Myers, Fla.—Bond issue of \$6,000 has been voted for sewerage extension.

Plant City, Fla.—At special election held on question of issuing bonds for sewerage, drainage and paving propositions were easily carried.

Marion, Ind.—Construction of combination storm and sanitary sewer from Canton glass works to Mississinewa river has been authorized.

Burlington, Ia.—City Council has passed resolutions authorizing construction of sewers in various streets. Robt. Kroppach, City Clerk.

Lexington, Ky.—Resolution has been adopted for construction of sanitary sewer on Fifth st. J. J. O'Brien, City Clerk.

Biddeford, Me.—Work on new sewer, which it is planned to start from White's wharf and run up Main st., will be commenced as soon as possible.

Flint, Mich.—Citizens have voted \$93,000 for constructing new sewage system.

Flint, Mich.—Bonds for construction of sewers, total cost of which is estimated to be \$423,000, have been authorized by vote of taxpayers. Work will shortly be advertised. H. E. Terry, City Engineer.

Carlton, Minn.—Installation of sewer system is under consideration.

Herman, Mo.—Plans and specifications are in progress for approximately five miles of sewer laterals. Date for receiving bids will be set within about three weeks. Burns & McDonnell, Kansas City, Mo., Consulting Engrs.

St. Joseph, Mo.—There will be bids for sewers in districts 8, 19, 1 and 7, and walks on First st. in South St. Joseph.

Audubon, N. J.—Plans and specifications for Audubon's new sewer system have been prepared, and several of largest construction firms in Philadelphia and New York are preparing to bid on work.

Camden, N. J.—Ordinance has been adopted authorizing construction of sewers, culverts or drains in and along Rose st., from Everett st. north about 100 feet; Morton st., from Louis st. to Norris st., and Sycamore st., from Seventh st. to Ninth st.

Hammonton, N. J.—Town has asked permission to establish sewage disposal plant.

Trenton, N. J.—Ordinances have been adopted for construction of sewers in various streets.

Schenectady, N. Y.—Ordinances have been adopted for construction of sewers in various streets.

Tolano, N. C.—Town will hold election April 29 on proposition to issue bonds in sum of \$10,000 for purpose of installing sewerage and water system.

Akron, O.—Bids will be received at the office of James McCausland, City Auditor, for purchase of bonds in sum of \$40,000 for Bowery st. main trunk sewer.

Akron, O.—Question of sewage and garbage disposal plant is being discussed.

Akron, O.—Ordinances have been passed authorizing construction of sewers in various streets.

Massillon, O.—Ordinance No. 1036, for issuing of bonds to amount of \$9,800 for construction of storm water sewers from intersection of Green and Wissmar sts. to valley north of Wooster st. and in East South st., from Mill st. to the Ohio canal, has been passed on suspension of rules.

Massillon, O.—Petition, asking Council to pass necessary legislation to construct sanitary sewer in Center st., north of State st., from number of residents of Center st., has been presented. It has been referred to committee on sewers.

Springfield, O.—Construction of sanitary sewer in South Limestone st. is being considered.

Toledo, O.—Ordinances have been adopted for construction of various sewers.

Durant, Okla.—Proposition to issue \$72,000 sewer extension bonds has been carried.

Myrtle Point, Ore.—Plans are being prepared for construction of sewer system.

Altoona, Pa.—Ordinances have been approved for construction of sewers in various streets.

Harrisburg, Pa.—Common Council has passed ordinance authorizing construction of sewer in Capitol st., from Briggs to North.

McKeesport, Pa.—Work of sewerage Punta Gorda st. has been authorized to be proceeded with.

Reading, Pa.—Board of Public Works has directed City Engineer Ulrich to advertise for sewer bids immediately in construction of storm water sewers of city under \$300,000 loan which passed councils few weeks ago. Advertising for bids is to be started within the next week or ten days. It was decided to construct sewer on North Sixth, in vicinity of the High School athletic field first, and then the Second and Elm sts. sewer. Laterals for northeast intercepting sewer in section of the city along Mt. Penn are also to be advertised immediately.

Wilkes-Barre, Pa.—Commissioners of Hanover Township have asked state department of health for permission to construct storm sewer on Oxford st. in Lee Park section of township.

Williamsport, Pa.—Preparing of ordinance providing for sewer under new Odd Fellows' temple, in Newberry, has been authorized.

York, Pa.—Joint resolution declaring necessary construction of sanitary sewer on Fifth st. between Walnut st. and Maple ave., has been passed.

Howard, S. D.—City Council has concluded arrangements to have plans drawn for sewerage system, which is to be installed in accordance with result of recent special election, when necessary bonds were voted. System will be completed during the coming summer.

Park City, Tenn.—Council will shortly advertise for sale \$10,000 worth of bonds for sewers and drains.

Brownsville, Tex.—Extensions of sewerage system in city are being asked by citizens.

Richmond, Va.—Bids have been invited for construction of sewer in Elm st.

Roanoke, Va.—Election will be held May 1 for voting on proposition of issuing bonds in sum of \$20,000 for installing sewerage system.

Suffolk, Va.—Construction of various sewers has been authorized.

Milwaukee, Wis.—Sewerage committee has recommended construction of storm sewer on Grand ave., from Milwaukee river to Third st., at cost not to exceed \$3,500 without formal contract, on advice of commissioner of public works.

Racine, Wis.—Bonds in sum of \$185,000 have been voted for sewer construction.

CONTRACTS AWARDED.

Dinuba, Cal.—By City Council, contract for installation of new outfall sewer system, plans for which have been completed, to Hall and Hunt, of San Francisco, at \$32,468.32. Work will start within thirty days.

Fowler, Cal.—To Chamber & Heafy, of Oakland, contract for constructing sewer system at \$16,079.

Danville, Ill.—To Carson & Payson, 16 E. Harrison st., contract, at \$62,900, for constructing 15 miles vitrified sewer pipe in Oak Lawn and Elmwood sts.

Galesburg, Ill.—By Bd of Local Improvement, contract to Merrifield Construction Co., of Monmouth, for W. Main st. sewer, at \$10,439.

Rossville, Ill.—To G. W. Prutsmann, 425 N. Vermilion st., Danville, Ill., contract for constructing 2,321 lin. ft. 12-in. pipe sewer for Rossville.

Cedar Rapids, Ia.—To Dearborn & Jackson, contract for two miles of sanitary sewers, at \$5,878.

California, Mo.—To construct about 4½ miles of lateral sewers to B. Inman, California, at \$15,647. Other bids were: E. D. Tyner, Kansas City, Mo., \$17,244; Edgar Main, Liberty, Mo., \$18,640; Plummer & Adams, Springfield, Mo., \$19,240; Page Construction Co., Kansas City, Mo., \$13,956; T. W. Roberts, Independence, Mo., \$16,173. Bids were opened Mar. 17. Burns & McDonnell, Scarritt Bldg., Kansas City, Mo., are Consult. Engrs.

Slater, Mo.—For furnishing material and constructing approximately 2½ miles of sewers and septic tank for this city from plans of Rollins & Westover, 420 Midland Bldg., Kansas City, to T. C. Brooks & Son, Jackson, Mich., \$15,771.

Columbus, O.—By Dir. of Public Service, contracts for construction of sewer-

ers, as follows: Milo storm sewer, John C. Beasley, 649 S. 22d st., at \$94,400; Clintonville storm sewer, J. Y. Ryerson, 817 W. Mound st., \$36,837; several small sewers, I. O. Jones, 707 Grove st., about \$25,000.

Chester, Pa.—Contract for sewer and water works has been awarded to Honan and Turner, of this city.

Wilkes-Barre, Pa.—By City, for constructing sewers in 24 streets (terra cotta pipe to be furnished to the contractor), to C. M. Reilly, Wilkes-Barre, \$30,089. Other bids as follows: R. M. Rosser, Kingston, \$34,304; R. G. Coon, Kingston, \$48,150; Penn. Sewer Co., Wilkes-Barre, \$30,860; Curnow & Gates, Wilkes-Barre, \$30,367.

Nashville, Tenn.—To T. I. Curtis & Son, contract for construction of sewer in 16th ave., north, and Hamilton st., by board of public works. Bid of this company was \$1,965.

WATER SUPPLY

Pasadena, Cal.—In order to lay water pipes on streets that are about to be paved, water department will be called upon to spend \$44,000. Two principal items are for Walnut st., about \$10,000, and for South Raymond ave., \$5,875. Following is estimate of cost of pipes for other paving: Walnut st., from Hill to east city limits (Woodbury Co.), \$1,998; Douglas, \$1,179; Bellevue, \$618; Logan, \$258; Pleasant, \$553; First, \$1,623; Mentor ave. (Las Flores Co.), \$547; Hudson (La Flores Co.), \$905; Kirkwood, \$920; Bedford, \$495; East Orange Grove, \$2,430; Winona, \$682; Lake, \$1,530; Oak Knoll; (San Gabriel Co.), \$5,441; Pasadena ave., \$1,300; Lincoln ave., \$4,495, and Atchison, \$330.

Sacramento, Cal.—Installation of high pressure water system and extension of water system is under consideration.

Georgetown, Del.—Election is being held to ascertain whether or not residents are in favor of bonding town for purchase of water plant from Georgetown Water Co., a private corporation.

Lewes, Del.—Election held at Rehoboth to pass upon proposition of bond issue of \$30,000 for establishment of waterworks has been carried.

Rehoboth, Del.—Bond issue of \$30,000 has been voted for establishment of water works.

Fort Myers, Fla.—Bond issue of \$7,000 has been voted for waterworks extension.

LaGrange, Ga.—City council of La Grange has accepted proposition of James Nesbit Hazelhurst, of Atlanta, for specifications and plans for new city waterworks plant, to cost \$150,000, and also for gas plant, to cost from \$50,000 to \$150,000.

Lake City, Ia.—Bond issue of \$12,000 has been voted for extending water works.

Harper, Kan.—Plans and specifications have been completed for waterworks improvements and extensions covering an expenditure of approximately \$20,000. Bond election has been called to vote bonds. Burns & McDonnell, Scarritt Bldg., Kansas City, Mo., Consulting Engr.

Oswego, Kan.—A bond election was called for April 1st to vote \$3,000 for waterworks improvements, including filtration. Plans for the improvements have been completed. Burns & McDonnell, Kansas City, Mo., Consulting Engrs.

Baltimore, Md.—Plans are being prepared for installation of filtration plant.

Blackstone, Mass.—Sum of \$20,000 has been voted for municipal water plant to furnish water for village of Millville.

Peabody, Mass.—Town of Peabody has appropriated \$5,000 for meters for water pipes. It has meters on all pipes leading to factories. It proposes to meter all pipes running to dwelling houses. Work will be done on installment plan, few meters being put into use each year.

Carlton, Minn.—Installation of waterworks system is being considered.

Walters, Minn.—Town has decided in favor of installing water works system.

Billings, Mont.—Bonds have been carried at Billings in sum of \$575,000 for complete new waterworks plant, including filtration. Plans are in progress and as soon as bonds are sold bids will be received. Burns & McDonnell, Scarritt Bldg., Kansas City, Mo., Consulting Engineers.

Livingston, Mont.—Bond election for \$225,000 for complete new waterworks plant, including filtration, is called for April 14th. Plans have been completed and approved by the City Council for this work. Burns & McDonnell, Scarritt Bldg., Kansas City, Mo., Consulting Engineers.

Defiance, O.—Installation of municipal water plant is under consideration.

Durant, Okla.—Proposition to issue \$13,000 water extension bonds has been carried.

Altoona, Pa.—Plans for new drinking system and filtration plant have been completed.

McKeesport, Pa.—Ordinance authorizing bond issue for \$14,000 for extension of water mains on Fifth ave. and Walnut st. will be presented. This ordinance will provide sufficient money to carry mains on Fifth ave., from Ash st. to forks of road and on Walnut st., from 13th st. to 16th st.

Coleman, Tex.—It has been recommended that Mayor and Council secure competent engineer and consider any proposition that seems feasible for securing permanent water supply.

Knoxville, Tenn.—George P. McTeer, commissioner of public property, will ask for appropriation out of water fund of \$25,000 to construct four additional filtration basins at filtering plant.

New Boston, Tex.—Bond election of \$15,000 for water works has been carried.

Payson, Utah.—City council has passed ordinance authorizing submission of question of incurring bonded indebtedness of \$43,000 for purpose of constructing waterworks system. Election will be held April 21.

Centralia, Wash.—Centralia City Commission has opened bids for the \$300,000 water bonds recently voted for purchase of local water plant of Washington-Oregon Corporation and construction of a municipal gravity water system. Carlson & Earls, of Seattle, Pratt & Henry, of Tacoma, and Bolger, Messer & Williams, of Chicago, being respectively the lowest three bidders.

Tacoma, Wash.—Cost to city of construction work that must be done on watershed to insure safety from pollution will cost approximately \$15,000, although final cost may be considerably less. This will not include expense of putting in hypochloride plant at McMillin reservoir, which will cost about \$10,000.

Milwaukee, Wis.—Purchase of a new 12,000,000 gallon per day capacity triple expansion engine at cost of \$75,000 for high pressure pumping station at North point has been recommended by water committee of common council. Building of additional shed for storage of water department trucks at cost of \$500 without formal contract has also been recommended.

Powell, Wyo.—Citizens will vote May 13 on \$6,500 bond issue for water works system.

CONTRACTS AWARDED.

Fullerton, Cal.—By city, for constructing service connections for distributing system of municipal waterworks, to J. F. Blair and A. O. Stovall, of Fullerton.

Burlington, Ia.—To construct clear water basin for Citizens' Water Co., to Phee Construction & Engineering Co., People's Gas Bldg., Chicago, Ill., at \$24,964.

Baton Rouge, La.—To J. D. Brown, of Baton Rouge, contract for building proposed concrete reservoir.

Grand Rapids, Mich.—To furnish c.-i. pipe for main extension to Lynchburg Foundry Co., Lynchburg, Va., at \$40,000.

Cascade, Mont.—To O. U. Miracle, of Kalispell, contract for constructing waterworks, at about \$17,500.

Asbury Park, N. J.—To Atlantic Construction and Supply Co., of Atlantic City, of which John H. Decker is president, has been awarded contract amounting to over \$80,000 for extension of waterworks at Asbury Park. There were half dozen bidders, Decker concern being lowest at total of \$82,929, based on 83 days at \$50 per day for completing work. Next lowest bidder was the E. R. Danforth Co., which bid total of \$84,996, based on 135 days to complete work at \$50 per day.

Cheviot, O.—To lay 6-in. water main in various streets to N. Ruebel, Cheviot, at \$8,000.

Youngstown, O.—By Bd. Pub. Service, contract for 1,500 tons c.-i. water pipe and 75 tons special castings, etc., to U. S. Cast Iron Pipe & Foundry Co., of Pittsburgh, Pa.

Hood River, Ore.—By city, to Giebisch & Joplin, of Portland, have secured contract for Div. 2 and E. O. Hall for Div. 5 of water system, at total of \$14,166.

Oil City, Pa.—By city, to National Transit Co., of Oil City, contract, at \$22,750, for vertical triple-expansion condensing crank and flywheel pumping engine, delivering 1,000,000 gals. per 24 hours, against head of 550 ft. at speed

of 24½ r. p. m.; with 50 per cent. increase in speed will deliver 1,500,000 gals.

Lebanon, Pa.—By Water Board, contracts for 103 valves for \$1,323 to Rensselaer Valve Co., of Troy, N. Y., and for same number of metal valve boxes to Bingham and Taylor Co., of Philadelphia, for average of \$2.70 each.

McKeesport, Pa.—To furnish and install one 400-hp. vertical water-tube boiler for Water Department, to Babcock & Wilcox, Pittsburgh, Pa., at \$5,331.

Rankin, Pa.—For new intake for waterworks of McClintic-Marshall Co., to Dravo Contr. Co., of Pittsburgh. Chester & Fleming, of Pittsburgh, Engrs.

Clarkston, Wash.—To L. L. Lent, of Bremerton, contract for constructing waterworks, at \$37,202.

Edmonds, B. C.—To Evans, Colman & Evans, of Vancouver, contract for extending water system, at about \$30,000.

LIGHTING AND POWER

Roanoke, Ala.—Mayor W. H. Mann has called election to be held May 1 for purpose of voting upon proposition of issuing bonds to amount of \$20,000 to improve and enlarge electric light plant, also to issue bonds for \$20,000 to install sewerage system.

Sulphur Springs, Ark.—City of Sulphur Springs has sold its \$25,000 bond issue and will shortly award contract for modern electric light plant and waterworks system. Specifications provide that both plants must be in operation by June 1.

Oakland, Cal.—Electric street lighting is being discussed.

Wilmington, Del.—Upon recommendation of Board of Water Commissioners the Board of Public Utilities Commissioners are considering establishment of municipal lighting plant.

Macon, Ga.—Extension of street lighting has been authorized.

Macon, Ga.—The Georgia Public Service Corporation has filed petition with City Council asking that franchise be granted to concern for operating gas plant in Macon. Application has been referred to joint committees on streets and lights.

Elkhart, Ind.—Mayor and Board of Public Works are considering establishing boulevard lighting system on Main st.; probable cost, \$6,000.

Goshen, Ind.—Plans and specifications have been completed for the electric lighting improvements and will be presented for approval at Goshen on April 7th. The improvements contemplate an expenditure of \$30,000. Burns & McDonnell, Kansas City, Mo., Consulting Engrs.

Clinton, Ia.—Clinton Gas and Electric Co. will at once prepare plans, specifications and estimates for reconstruction of its electric light plant.

Lowell, Mass.—Municipal Council has voted to install arc lights on various streets.

Albion, Mich.—City Council is contemplating installation of municipal electric light plant.

Detroit, Mich.—Many improvements will be made in lighting systems along Great Lakes this year, and work will be commenced as soon as weather and ice conditions permit.

Grand Rapids, Mich.—It will cost city \$8,520 for initial installation of boulevard lighting system on Ionia ave., from Oakes st. to Lyon st. That estimate has been prepared by board of works for common council, which is considering improvement.

East Grand Forks, Minn.—East Grand Forks will soon establish a new electric lighting plant, bids having been made for its construction. Contract will be let April 1 by city utilities commission.

Virginia, Minn.—City Council is said to have decided to extend the white way system on Central and Mesaba aves., at cost of \$9,000.

Syracuse, N. Y.—Election will probably be held for voting on question of municipal ownership of a light and power plant.

Wilson, N. C.—Wilson will vote on April 15 on question of issuing bonds in sum of \$80,000 for rebuilding of municipal light and power plant.

Portland, Ore.—Mayor Rushlight, who is investigating proposition of installing municipal lighting system, has received from J. H. Cunningham, a civil engineer, report on cost of such a project. Expert bases his report on developing hydro-electric generating plant on Clackamas River 12 miles from this city where rights can be obtained. Plant capable of generating many thousand horsepower would cost approximately \$2,433,000.

Meadville, Pa.—Installation of curb lights on several streets is being planned.

White, S. D.—At special election April 10 voters will have submitted to them proposition of \$5,000 bond issue for municipal electric lighting system.

CONTRACTS AWARDED.

Hayward, Cal.—Ordinance calling for \$14,000 fire bond election to be held on April 10 next has been drawn up by Board of Town Trustees. Firehouse is proposed to be erected on Castro st. An up-to-date fire engine and fire signaling apparatus is sought.

Austell, Ga.—Mayor and council have closed contract with J. B. McCrary Co., of Atlanta, to furnish city with electric lights and power.

Batavia, Ill.—By city, to Chicago office of American Engine Co. of Bound Brook for American-Ball, angle-compound engine to drive by direct connection Westinghouse 250-kva generator with direct-connected exciter.

Elgin, Ill.—To Western United Gas & Electric Co., contract for gasholder to Bartlett-Hayward Co., of Baltimore, Md., at \$175,000.

Freeport, Ill.—By Freeport Gas Co., for two gasholders, to Stacey Mfg. Co., of Cincinnati, O., at about \$60,000.

Kendallville, Ind.—For construction of municipal electric-light plant to Beers-Ofcut Construction Co., Fort Wayne, Ind.

Richmond, Va.—Bids have been accepted for supplies for city electric plant as follows: Tower-Binford Co., for plant equipment, \$1,789.70; also for line transformers and lightning arresters, \$2,260.30; General Electric Co., for 9,000 pounds of copper wire, \$1,469.

Winnipeg, Man.—By City Council, to Canadian Westinghouse Co., Winnipeg, contract for manufacture, delivery and installation in generating station at Point-du-Bois of one 9,000 3-phase step-up transformer, costing \$13,000, and to the Standard Underground Cable Co., for 60,000 lbs. of Nos. 2, 4 and 6 copper wire at \$19.83 per 100 lbs.; contract to Canadian British Insulated Cable Co., Montreal, for 12,900 ft. of 3-core, 13,000-volt cable at \$1.27 per ft. to connect the McPhillips and King Sts. substations.

Timpson, Tex.—By City Council, to P. W. McKittrick, a 5-year contract to light streets of city.

FIRE EQUIPMENT

Sacramento, Cal.—More equipment for fire department is recommended.

Bridgeport, Conn.—Appropriation of \$15,000 has been made for purchase of new auto engine and auto hose wagon.

Santa Monica, Cal.—As preliminary to bond issue variously estimated anywhere from \$80,000 to \$90,000, city engineer has been instructed to prepare plans and suggest assessment district for fire protection system.

Belvidere, Ill.—City council has voted to include in annual appropriation ordinance to be adopted sum of \$6,000 for purchase of combination hose, chemical and ladder auto wagon.

Brockton, Mass.—Ordinance has been passed authorizing loan of \$15,000 for purchase of motor apparatus.

Haverhill, Mass.—Order providing for purchase of motor ladder truck and hose wagon for fire department, to cost, \$11,200, has been introduced in municipal council by Alderman Bartlett, head of the fire and police departments.

Nahant, Mass.—Purchase of motor pumping engine is being considered.

Swampscott, Mass.—Appropriation of \$16,140 has been provided for purchase of automobile pumping engine for fire department.

Omaha, Neb.—Appropriation of \$50,000 is recommended for additional fire equipment.

Bradley Beach, N. J.—Borough Council has decided that if automobile equipment for fire department can be procured as cheaply as construction of new stable, it will purchase such apparatus. A committee has been named to secure bids on auto combination patrols.

Camden, N. J.—Ordinance has been adopted authorizing issuance of bonds to the amount of \$25,000, for purpose of purchasing land and erecting building or buildings, and equipping same with apparatus and appliances, necessary for fire department purposes.

Maplewood, N. J.—Purchase of motor pumping engine has been authorized.

Ocean City, N. J.—City is considering bond issue of \$10,000 for purchase of motor apparatus.

Millville, N. J.—Public Building Committee and Fire Committee of City Council have decided to purchase site on West Main st. for proposed new fire house.

Brewster, N. Y.—Purchase of tractor is under consideration.

Corning, N. Y.—Common Council may spend \$13,000 for motor apparatus.

Port Chester, N. Y.—Proposition will be voted on April 22 for spending \$17,000 in purchase of fire equipment. Petition has been received from Harry Howard Hook & Ladder Company requesting purchase of a gas and electric motor truck at cost of \$8,500.

Southampton, L. I., N. Y.—Purchase of auto hook and ladder truck has been authorized.

Akron, O.—Bids will be received at office of City Auditor, for purchase of bonds in sum of \$65,000 for fire apparatus.

Hamilton, O.—Purchase of tractor for ladder truck and auto for chief has been decided on.

Erie, Pa.—Committee has practically decided to recommend purchase for this department of motor-driven combination chemical and hose wagon. Two were asked for in requisition, but it is likely that one will be purchased.

Newport, R. I.—Sum of \$5,000 has been appropriated for new wagon.

West Chester, Pa.—Purchase of motor combination chemical and hose wagon for Fame Fire Co. is under consideration.

Wilwaukee, Wis.—Ordinance has been adopted providing for \$50,000 bond issue for new fire stations, apparatus and other equipment.

CONTRACTS AWARDED.

Joliet, Ill.—To Robinson Fire Apparatus Mfg. Co., St. Louis, Mo., for one motor combination chemical and hose wagon at \$5,450.

Belmar, N. J.—To Gutta Percha & Rubber Mfg. Co. for 500 ft. of their "Maltese" brand hose.

Newark, N. J.—Contracts for five motor-driven fire-fighting vehicles, to cost \$44,200, have been awarded by Fire Board. The new apparatus will be installed in firehouses recently completed or now approaching completion. The successful bidders and the vehicles they will supply are: American-La France Fire Engine Co., on 75-ft. extension ladder, 4-wheel motor drive truck, \$11,500; one 90 horse-power combination engine and hose car, \$8,500; the Webb Mfg. Co., one 75-ft. extension ladder, 4-wheel motor drive truck, \$10,500; 110-brake horse-power motor drive engine, \$8,000; the White Motor Car Co., one 6-cylinder 60 horse-power combination hose and chemical car, \$5,700.

Princeton, N. J.—By Council, contract to Fabric Fire Hose Co., New York City, for 500 ft. of wax-treated double safety brand hose at \$1 per ft., and to Mercer Rubber Co., Trenton, N. J., for 500 ft. of para rubber hose at \$1.15.

BRIDGES

Redding, Cal.—It has been definitely decided by Board of City Trustees to call \$60,000 bond election for purpose of building bridge over Sacramento River at head of Market st.

Dover, Del.—House bill, authorizing Levy Court of New Castle county to borrow \$250,000 to construct bridge over Christiana river at Third st., Wilmington, has passed Senate.

Pass Christian, Miss.—Third District Good Roads Commission is preparing plans and specifications for bridge across Bayou Portage and road to Wolf River to be submitted to Board of Supervisors at its April Meeting.

Billings, Mont.—Construction of bridge across Little Missouri in bad lands of North Dakota is being considered.

Perth Amboy, N. J.—County Engineer has been authorized to prepare plans for widening of bridge over Brown's brook in Woodbridge.

Albany, N. Y.—Bill providing for construction of new bridge over Oswego river and barge canal at Minetto is being considered.

Akron, O.—Bids will be received at office of James McCausland, City Auditor, for purchase of bonds in sum of \$37,000 for repairing bridges, sewers and streets.

Cincinnati, O.—Estimated cost of concrete bridge over Muddy Creek on Lower River road is \$18,900.

Bechtelsville, Pa.—Berks County Commissioners have approved proceedings for new county bridge across North branch of Swamp Creek at Bechtelsville.

Butler, Pa.—Rebuilding of Bear Creek bridge in Parker township is advocated.

McKeesport, Pa.—Sale of \$550,000 worth of bridge bonds has been authorized by county commissioners.

Wilkes-Barre, Pa.—Construction of East End bridge is being considered.

Knoxville, Tenn.—Plans are being prepared for construction of viaduct to join city of Knoxville and Park City.

Knoxville, Tenn.—Plans for Park ave. viaduct have been ordered drawn by J. E. Thompson, city engineer, and W. B. Crenshaw, chief engineer of Southern railway.

Puyallup, Wash.—After long discussion on feasibility of constructing concrete or pile bridge across Clark's creek to replace present pile bridge, city council has ordered engineer to draw up specifications for bridges of both materials and call for bids immediately.

CONTRACTS AWARDED.

Dyerville, Cal.—For constructing highway bridge over Eel River at Dyerville, to consist of steel span, 300 ft. long and about 500 ft. wooden approaches, to Chico Constr. Co., of Chico, as follows: 300-ft. steel span and foundations, \$22,893; piles for approaches per lin. ft., 20 cts.; redwood lumber for approaches, per M. ft., \$22.50; and pine lumber for approaches, per M. ft., \$21.

Rome, Ga.—By City Council, contract to build bridge over Burwell Creek, near pumping station, to T. H. Booz, Jr., at \$553.50.

Waukegan, Ill.—By City, contract for constructing Genesee St. viaduct to John Wheeler Construction Co., of Geneva, at \$72,619.

Leo, Ind.—By board of commissioners of Allen county, contract to Burke Construction Co., Newcastle, Ind., at \$16,780, for construction of 92-ft. span steel and concrete bridge over St. Joseph river.

Perth Amboy, N. J.—Contract for erection of approach to Cheesecake creek bridge has been awarded to Conrad Sebolt, of this city, his bid of \$5,856.56 being lowest. Contract for erection of concrete bridge over branch of Rahway river has been awarded to Carman & Smith, of Metuchen, their bid of \$1,692 being lowest.

Schenectady, N. Y.—Ordinance has been adopted authorizing city to loan its credit for issue of bonds in order to procure funds for purpose of making bridge across Cotton Factory Hollow, between Hulet st. and Francis st.

Hamilton, O.—By board of commissioners of Butler county to John Conrad, at \$1,424, for construction of bridge at McCurley farm in Fairfield township.

Youngstown, O.—Ordinance is being considered calling for bridge at Holmes st. Engineer has been requested to draw plans for structure at once.

Jeannette, Pa.—By City Council, contracts for construction of steel and concrete bridge over railroad tracks at 2d st., as follows: Steel construction work, John Eichlay, of Pittsburgh, at \$5,042, and concrete portion to East End Construction Co., of Pittsburgh, at \$2,335.

Philadelphia, Pa.—By Dir. Dept. of Pub. Wks., for bridge work and the following are totals of bids received: Montgomery st., over connecting R. R., 29th and 32d wards, steel plate girder bridge encased in concrete, on concrete masonry, 50 ft. wide, 214 ft. long, with paving, to F. J. Boas, 201 Broad st., \$49,244. Other bids as follows: M. & J. B. McHugh, 714 Arcade Bldg., \$54,948; Stier-Marsh Co., 1011 Chestnut st., \$51,430; Richard Walsh, 5922 Tacony st., \$54,275; American Paving & Construction Co., 211 S. 9th st., \$54,750; Cramp & Co., Denckla Bldg., \$49,960. 66th ave., N., over North Penn R. R., 42d ward, concrete arch, 40-ft. span, 78 ft. wide, with paving, to Richard Walsh, 5922 Tacony st., \$24,750. Chester ave., over West Chester & Philadelphia R. R., 40th and 46th wards. Steel girders encased in concrete, with extensions to present stone abutments, 70 ft. wide, 100 ft. long, to Jos. Perna, 334 N. 65th st., \$26,500. Other bids as follows: Ferro-Concrete Co., Calder Bldg., Harrisburg, \$23,621; Stier-Marsh Co., 1011 Chestnut st., \$25,800; Jas. Kelly, Bulletin Bldg., \$24,100; M. & J. B. McHugh, 714 Arcade Bldg., \$34,980; Nelson Merydeth Co., Chambersburg, \$24,880. City ave., over Indian Run, inter-county. Concrete arch, 20-ft. span, with filling, paving and concrete balustrade, to M. & J. B. Hugh, 714 Arcade Bldg., \$31,448.

Lebanon, Tenn.—Wilson county will construct bridge across W. Main st., to cost \$2,000, and across Sanders Fork, to cost \$2,500.

Logan, Utah.—County engineer has been authorized by County Commission-

ers to advertise for steel bridge to be constructed across Bear River, near Cache Junction and Newton.

Lumberport, W. Va.—For construction of bridge across West Fork River at Lumberport to Riverside Bridge Co., Wheeling, W. Va., at \$30,230.

Aberdeen, Wash.—Voters will be asked to express opinion on proposed issue of \$100,000 in bonds to build a bridge over Wishkah River. This will be the first bridge of the kind in this section if bond issue carries.

Vancouver, B. C.—For constructing Georgia-Harris viaduct to J. McDiarmid & Co., of Winnipeg, Man., and Vancouver, B. C., at \$455,000.

MISCELLANEOUS

Los Angeles, Cal.—Erection of public comfort station is under consideration. Plans for same have been prepared by Parkinson & Bergstrom.

Los Angeles, Cal.—Approval has been given by city council to specifications for garbage disposal.

Northside, Cal.—Proposed bond issue for park, playgrounds and fire department equipments has been indorsed by Lincoln Avenue and Northwest Improvement Association.

Oakland, Cal.—New bids for manufacture and erection of steel work for new municipal auditorium, which is to cost \$500,000, will be advertised for by city clerk.

Pasadena, Cal.—Council has decided to advertise for bids for auto runabout for use of street department.

Sacramento, Cal.—At meeting of City Commission date of Capitol Extension bond election was officially set for April 5th.

San Diego, Cal.—Bonds in sum of \$175,000 have been sold to San Diego Savings Bank and American National bank. With money heads of various departments will at once put several hundred men to work laying water and sewer mains at cost more than \$100,000, erection of bridges and other street improvements at cost of \$55,000 and erection of public comfort station on plaza and in Balboa park at cost of \$10,000.

San Francisco, Cal.—City Engineer's department has been authorized to prepare detail plans and specifications for Fillmore st. and Twin Peak tunnels, together with estimates of cost of construction.

San Francisco, Cal.—All bids recently received for \$5,248,000 worth of municipal bonds have been rejected by Board of Supervisors, and new bids called for, to be opened on March 31st.

San Jose, Cal.—Installation of garbage disposal plant is being considered for converting city garbage and street sweepings into coal.

Santa Monica, Cal.—Plans are being developed for conversion of Seventh st. park, which occupies entire block on Nevada ave., into playground.

San Rafael, Cal.—Representative citizens of San Rafael have indorsed expenditure of \$250,000 for municipal improvements. Proposed \$250,000 expenditure will be divided as follows: Municipal bathhouse, \$50,000; stadium and recreation park, \$25,000; incinerating plant, \$25,000; street improvements, \$10,000; dredging San Rafael canal and building municipal wharves, \$140,000.

Hartford, Conn.—Taxpayers will shortly vote on resolution appropriating \$100,000 for erecting and equipping contagious hospital; also \$17,000 for erecting bath houses in Pope Park.

Denver, Colo.—Establishment of floral hall at city park, costing between \$20,000 and \$25,000, is under consideration by city park board, and action authorizing remodeling of old greenhouses is being discussed.

Atlanta, Ga.—Bids received for 12,000 barrels of cement have been rejected.

Springfield, Ill.—Purchase of motor patrol wagon for police department has been authorized and bids for same will be advertised.

Springfield, Ill.—Board of Supervisors have authorized \$15,000 appropriation for purchase of site and building of workhouse.

Muncie, Ind.—Engineer Deardoef has filed estimates for various public improvements.

Carroll, Ia.—Bond issue of \$15,000 will be voted on April 4 for erection of new city hall.

Creston, Ia.—The Creston, Winterset & Des Moines railroad will probably be shortly in the market for the lease or purchase of a used steam shovel, dump cars and light locomotive, or they may

make contract for ditching, etc., to parties having such an outfit. Theo. S. De Lay, Civil Engineer.

Danville, Ky.—Bank of Maysville has been awarded \$30,000 worth of Danville, Ky., city bonds.

Pittsfield, Me.—It has been voted to buy steam roller and stone crusher; \$3,750 has been appropriated for same.

Chelmsford, Mass.—Town has voted to purchase portable stone crushing outfit.

Gloucester, Mass.—Order appropriating \$2,000 for purchase of stone crusher and boiler has been taken from table and adopted.

Holyoke, Mass.—It has been voted to advertise for bids for street flushing machines.

Swampscott, Mass.—Appropriation of \$900 has been made for purchase of tank wagon for street oiling.

Swampscott, Mass.—Appropriation of \$700 has been made for new boiler for engine of stone crusher.

Duluth, Minn.—Council is expected to pass ordinance appropriating \$4,000 with which to purchase automobile police patrol and emergency ambulance.

Jefferson City, Mo.—A constitutional amendment authorizing city of St. Louis to become indebted to extent of \$30,000,000 for construction of municipal subway has passed the Legislature.

St. Louis, Mo.—House of Delegates has passed Board of Public Improvements bill, appropriating \$10,000 for hiring of expert to lay plans for municipal garbage plant.

Bayonne, N. J.—Bayonne City Council has decided to purchase several plots of ground near Avenue C and 28th st., for civic centre. Property will cost \$97,325. A city hall, fire headquarters, post office, public library, police headquarters and high school will be built.

Essex Falls, N. J.—Bids will be received by the Borough Council of Essex Falls, New Jersey, until 9 o'clock p. m., on April 4, 1913, for all or any part of \$10,000 coupon bonds to be issued for purpose of acquiring site for and erection of a borough hall for the use of the borough. H. A. Miller, Borough Clerk.

Harrison, N. J.—Street committee of Harrison Town Council has decided to recommend to Council that it reject all bids received for scavenger work last session, and to readvertise for new bids.

Hoboken, N. J.—Hoboken Police Commissioners are discussing plans whereby new and better electric police signal system could be installed to cover entire city.

Long Branch, N. J.—Board of Commissioners has rejected four bids received for erecting the Avenel Boulevard pavilion and 64 bath houses.

Brooklyn, N. Y.—Approval has been given by the Board of Estimate to plans of Bridge Commissioner O'Keefe to expend \$675,000 on Brooklyn plaza of Manhattan bridge.

Buffalo, N. Y.—Councilmen have approved bills providing for bond issues of \$100,000 for improvement of playgrounds and \$500,000 for public buildings.

Croghan, N. Y.—Village board has voted \$8,000 bond issue for erection of village hall.

Ithaca, N. Y.—Resolution adopted by Board of Public Works provides that \$4,000 be appropriated from special creek fund for work on Six Mile and Cascadilla creeks and for repairs to walls which were damaged by recent storms.

Jamestown, N. Y.—Jamestown's common council has approved recommendation of board of public works providing for purchase of land and building of public market house extending from Harrison st. through to Talor st., near Main st., at cost of \$25,000. Proposition will be submitted to vote of the taxpayers of city on April 1st.

New York City, N. Y.—It has been decided to spend about \$15,000,000 for dock improvements this year.

Rochester, N. Y.—Clerk Pifer has been instructed to advertise for bids for sprinkling for the season, and resolution has been passed requiring bond of \$40,000 and \$10,000 in cash to insure proper performance of the contract. Estimated cost for 1913 is \$84,607, with 149 miles of streets.

Schenectady, N. Y.—Board of contract and supply has been authorized to advertise for bids for construction of garbage disposal plant, also for equipment for same.

Southampton, L. I., N. Y.—Purchase of steam roller has been authorized.

Southampton, L. I., N. Y.—Installation of police and fire alarm system has been authorized.

Tarrytown, N. Y.—Appropriation of \$15,000 has been made for public dock and park.

Grafton, N. D.—County Commissioners are discussing question of new jail.

Silver City, N. M.—Plans are being considered for erection of new city hall.

Akron, O.—Question of garbage disposal plant is being discussed.

Erie, Pa.—Tentative awards have been made the Fulton Engine Co. for service boat to be used by city water department.

Marcus Hook, Pa.—Marcus Hook will be given opportunity to vote on question of borrowing \$60,000 for borough improvements.

Mendville, Pa.—Mayor recommends that automobile runabout be purchased for use of Street Commissioner during daytime and for use of police at night.

Wilkes-Barre, Pa.—Plans drawn by Architects Reilly and Schroeder for proposed public comfort station have been adopted by public property committee of councils and committee will recommend their adoption by councils.

York, Pa.—Ordinance authorizing commissioner of public property to contract for automobile patrol wagon at cost not to exceed \$2,350 is being considered.

York, Pa.—Division of city's proposed \$300,000 loan for permanent improvements has been made to provide funds for completion of sanitary sewage system, street openings and paving, more storm water sewers, widening of Codorus creek, park, improvements, purchase of auto fire apparatus and several minor undertakings.

Woonsocket, R. I.—Aldermanic Committee on Streets and Bridges is considering purchase of new steam roller. Bids will be advertised in near future.

Clear Lake, S. D.—In accordance with petition which has been filed with City Council, question of issuing bonds in sum of \$5,000 for erection of a city hall building will be submitted to voters at annual election in April.

Bonham, Tex.—City Council has passed ordinance ordering election to determine upon issuance of bonds for following purposes: Crematory, \$6,500; new equipment for fire department, \$3,000. Date of election was set for April 8.

Dallas, Tex.—Ordinance providing for issuance and sale of \$275,000 City Hall building bonds has been passed.

Dallas, Tex.—City is planning to enlarge crematory plant.

Galveston, Tex.—Authority has been granted to advertise for bids on electric automobile truck to be used in city's electric lighting department. Complete cost of this truck has been estimated at \$3,000.

Salt Lake City, Utah.—Installation of two modern incinerating plants to take care of garbage is being considered.

Salt Lake City, Utah.—Purchase of four new road sprinklers has been authorized.

Bristol, Va.—Plans are being made for new jail which will cost about \$20,000.

Lynchburg, Va.—The Board of Police Commissioners has decided to install modern central office station for police telegraph system, together with flashlight signals. New work will cost city about \$3,500. Board has decided to install equipment made by Gamewell Fire Alarm and Police Telegraph Company, which will largely facilitate department in its work.

Newport News, Va.—City Engineer Pearce has been authorized by unanimous vote to proceed with preparation of plans for digging of harbor 300 ft. wide from mouth of Newport News Creek to Thirteenth st.

Green Bay, Wis.—Appropriation of \$6,000 has been made by Brown county board of supervisors for purpose of buying road machinery. Two outfits, consisting of rollers, scraper, crushers, and other implements are to be purchased.

Racine, Wis.—Bonds in sum of \$50,000 have been voted for park improvements.

CONTRACTS AWARDED.

Pensacola, Fla.—Contract for repairing city wharves at Pine and Magnolia sts. has been awarded to C. H. Turner Construction Co. Bid of the company for work on Pine st. wharf was \$607.25 and for Magnolia st. wharf, \$721.73.

Atlanta, Ga.—Contract for sand has been awarded to Smiley Sand Co., at 65 cts. per ton, and contract for steel reinforcements for concrete to Atlanta Steel Co.

Augusta, Ga.—By city, for building of earthwork levee from Hawk's Gully to Washington st., to A. J. Twiggs & Son, of Augusta, at \$101,000.

Camilla, Ga.—For erection of new \$20,000 city hall to Winder Lumber Co.

Marion, Ind.—By county commissioners, contracts for construction of ten concrete arches in different parts of Grant county. Mason & Moreland, Alexandria contractors, secured ten of the contracts, as follows: John Caskey arch, Fairmount township, \$485; East Branch arch, Fairmount township, \$229; George Maddox arch, east Jefferson and Blackford county line, \$264; Smith arch, Green township, \$297; N. J. Leisure arch, No. 1 Green township, \$177; N. J. Leisure arch, No. 2, Green township, \$197; N. J. Leisure arch, No. 3, Green township, \$197; Covalt arch, Green township, \$403. Two contracts were awarded E. R. Hoover, of Marion, as follows: Bertha Snider arches Nos. 1 and 2, \$579; William R. West arch, Richland and Sims, \$638.

Lexington, Ky.—Commissioner K. G. Pulliam has recommended purchase of new auto police patrol wagon from Kismet Motor Car Co., of Hartford, and Milwaukee, Wis.

Boston, Mass.—Contract for work on Dorchester tunnel, in Summer st., has been awarded to Hugh Nawn Contracting Co., at \$351,043.

Lawrence, Mass.—Lowest bidder for furnishing city with 15,000 ft. of edge-stone was received from the Lovejoy Granite Co., of Milford, N. H., at 39c. per lin. ft.

Lynn, Mass.—Bids for stable fittings for new municipal stable have been presented by Commissioner Bayrd as follows: Lynn Stall Co., \$3,691.50; Puritan Iron Works, \$3,275.86; Broad Gauge Iron Works, \$3,205.49, and W. A. Snow Iron Works, \$3,182. Contract was awarded to Puritan Iron Works, second highest bidder.

St. Paul, Minn.—For new asphalt plant to F. D. Cummer & Son, of Cleveland, O., at \$10,950.

Kansas City, Mo.—By Board of Pub. Works, contract for constructing refuse disposal plant of 75-ton capacity, to Lewis & Kitchen, of Kansas City, at \$41,985.

Perth Amboy, N. J.—Following contracts for supplying of stone delivered on roads awarded to contractors below, their bids being lowest: Herman Brother, of Rosevelt, road from Rosevelt to East Rahway county line road, \$1.25 per ton. F. R. Uptin, of Dunellen-Iselin, Oak Tree road, \$1.55 per ton; Landing Bridge-Mettler's Lane-New Market road, \$1.60 per ton. Delaware River Quarry & Construction Co., of Rocky Hill-Woodbridge-Iselin road, \$1.65 per ton; Menlo Park-Iselin Union county line road, \$1.60 per ton; Livingston ave.-Livingston Park road, \$1.75; New Brunswick-Franklin Park road, \$1.70; Monmouth Junction-Kingston road, \$1.85; Cranbury-Cranbury Station-Union Valley road, \$1.85; South River road, \$1.65; Highland Park-Metuchen road, \$1.75; Aqueduct-Plainsboro road, \$1.90; Metuchen-Menlo Park road, \$1.75.

Newburg, N. Y.—By City Council for construction of South st. pier to William Parrott, at \$9,480.

Whitesboro, N. Y.—To Elmer E. Wadell for sweeping and cleaning of village streets for next three years at 11 cts. per 100 lin. ft.

Bismark, N. D.—To Milstad & Person, under firm name of Bismark Construction Co., for erection of municipal auditorium at \$34,945. Total bid, including electrical work, heating and plumbing, \$42,802.

Hope, N. D.—Contract has been let for new city hall to cost \$10,780. C. Johnson of Fargo was lowest bidder.

Chester, Pa.—By city councils, James Kelley, of Philadelphia, lowest bidder, contract for straightening of Chester river above Ninth st. The Chester river improvement, according to contracts let for walls Nos. 1 and 4 to James Kelley, will cost: Wall No. 1, \$3,650; Wall No. 4, \$14,980; total, \$18,630.

Wilkes-Barre, Pa.—Five-year contract for cleaning streets has been awarded to Curnow & Murray.

Newport, R. I.—By Board Contract for collecting ashes to Neffer & Hattub for five-year period ending in January, 1918, at their bid of \$10,100 a year.

Racine, Wis.—By Board of Health for erection of new isolation hospital at Gatlin to William Benatzke & Sons, at \$4,440.

